ALASKA AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF ALASKA
In Cooperation With
UNITED STATES DEPARTMENT OF AGRICULTURE

Report of Progress

January 1, 1950 to December 31, 1950

By
Don L. Irwin, Director

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ALASKA AGRICULTURAL EXPERIMENT STATION STAFF 1/

December 31, 1950

Administration

Don L. Irwin, Director
Emil G. Ganschow, Administrative Officer
Kathlyn R. Pippel, Administrative Assistant
Alice M. Snodgrass, Fiscal Assistant
Bonnie J. Bettine, Purchasing Assistant
Lucille K. Mick, Editor-Librarian
John E. Osguthorpe, Fairbanks Station Superintendent (F)
Carter D. Sherman, Fairbanks Farm Foreman (F)
Lucius Ross, Matanuska Station Superintendent
Harold E. Gershmel, Matanuska Farm Foreman
James R. Leekley, Petersburg Station Superintendent (P)

Research Departments

Agricultural Economics
Hugh A. Johnson, Head
Clarence A. Moore

Agronomy
H. J. Hodgson, Head
S. C. Litzenberger
Basil M. Bensin (F)
John E. Osguthorpe (F) 2/

Entomology
Richard M. Washburn, Head

Horticulture
Myron F. Babb, Head
Curtis H. Dearborn
Arvo Kallio (F)

Agricultural Engineering
C. Ivan Branton, Head

Animal Husbandry
William J. Sweetman, Head
Wallace R. Middleton
Frederick L. Swingle (F)
James R. Leekley (P)
Lucius Ross 2/

Soil Science
Allan H. Mick, Head
Winston Laughlin
Paul F. Martin
Margaret R. Blom
Neil Michaelson 2/

1/ (F) after a name indicates the address as Fairbanks Station, College, Alaska. (P) indicates Petersburg Station, Petersburg, Alaska. The post office address for all others is Palmer, Alaska.

2/ Part time research employee.

REPORT OF THE DIRECTOR

At the beginning of calendar year 1950, 7 departments were operating in the Alaska Agricultural Experiment Station. These departments are Administration, Soils Science, Horticulture, Agronomy, Animal Husbandry, Agricultural Economics, and Agricultural Engineering. During the year, the Department of Entomology was organized. Research work in each department is conducted on a project basis. All projects are approved and funds allocated for their support before work is initiated.

Under a Memorandum of Agreement between the University of Alaska and the United States Department of Agriculture, the research work on agricultural problems is integrated into one joint program. The Director and all department heads are joint employees of the University and the Federal Government. Technicians and other Station personnel may be joint employees or employees of either the University of Alaska or of the United States Department of Agriculture. The physical plant and equipment of both parties to the agreement are being used in this joint research program.

Personnel

Technical personnel engaged in full time research activities in the several Station departments include: Soil Science, 5; Horticulture, 3; Agronomy, 4; Animal Husbandry, 5; Agricultural Economics, 2; Agricultural Engineering, 1; and Entomology, 1. This enumeration represents personnel at all of the University Stations as well as the Federal Station in Palmer. It does not include either employees hired as laborers on a yearly basis or those hired for seasonal work. Administrative personnel includes the Director and those employees whose services are required in connection with purchases, payrolls, accounts, personnel records, travel, statistical analysis of data, Station superintendents, clerks, and typists.

Changes in personnel during 1950 are listed: Richard W. Washburn, Ph.D., was appointed Station Entomologist on March 3, 1950. Clarence A. Moore, M.S., received a permanent appointment as Agricultural Economist (GS-9) January 8, 1950. Lucille K. Mick, M.A., became Editor-Librarian March 8, 1950. Wallace R. Middleton, B.S., assumed duties as Animal Husbandman (GS-7) at the Matanuska Station April 2. On May 1, 2 Horticulturists were added to the Station staff: Curtis H. Dearborn, Ph.D., Horticulturist (GS-11) at the Matanuska Station and Arvo Kallio, M.S., Horticulturist (GS-9) at the Fairbanks Station. James Scott began working July 9 as Engineering Draftsman (GS-5) in the Agricultural Engineering Department but terminated August 21 to join the armed forces. Bonnie J. Bettine became Purchasing Assistant (GS-5) September 3, replacing Mrs. Flora Newcomb, resigned. Frederick L. Swingle, B.S., assumed the position of Animal Husbandman (GS-7) at the Fairbanks Station October 29. Also on October 29, Margaret H. Blom, B.A., began work as Laboratory Technician at the Palmer Station.

Substantial progress was made in coordinating the agricultural research work as provided under the Memorandum of Agreement between the University and the Federal Departments. Personnel vacancies still exist in the projected Departments of Plant Pathology and Nutrition. Applications are now being received to fill these vacancies at an early date.

Audits

Vouchers for expenditure of Federal Appropriations are audited in the General Accounting Office in Washington, D. C. prior to payment. A request for an audit of Territorial Station expenditures for the 1949-50 fiscal year was made to the Office of the Territorial Auditor, Juneau, Alaska. The Director was informed that no funds were available for an audit and that such funds would have to be appropriated by the 1951 Territorial Legislature before an audit could be made. Station expenditures of Territorial funds for the last fiscal year have therefore not been audited. A representative of the Office of Experiment Stations, Dr. N. E. Farris came to Alaska in June, 1950, and inspected the Station expenditures of Federal-grant funds. All projects were reviewed by him in conference with each of the department heads and technicians to determine the progress being made on each project. His suggestions and recommendations with respect to the various phases of fiscal and project work were very helpful in coordinating the research work.

Inventories

A complete inventory of all physical property of both the University and Federal Stations was taken on July 1, 1949. Since that time, additions of equipment and buildings have been added as they were acquired. Two separate inventory lists are maintained: one of all physical property belonging to the University Stations and the other listing physical plant and equipment which are property of the Federal Station. Under Superintendents' reports, details on buildings, improvements, and equipment received will be found covering items at each of the University Stations.

Buildings

An extensive building program to facilitate research operations has been in progress during the year.

Fairbanks Station

At the Fairbanks Station, the coal stoker was installed in the boiler room of the new messhall. From Territorial Legislature Appropriations, a steam line was extended from the messhall to the barn, garage-threshing shed, potato cellar, and to the apartment above the former milk room.

A garage-threshing shed 40'8" x 60' with a fireproof grain storage was constructed on forced account. This building will permit storage and repair of Station automotive equipment during winter months. Farm machinery can also be repaired when necessary in the garage building during winter months. The threshing shed will be used for drying, threshing, and storing experimental grain samples.

A concrete floor was completed in the room in front of the potato cellar. This will be used as laboratory space for horticultural work.

A room above the potato cellar, which for several years has been used as a laboratory for processing and sampling of cereal and forage crop seeds, is being rehabilitated to make it more suitable for the purpose. A new 3-phase power line approximately 1½ miles long was built to connect the University and Fairbanks power terminal with the various buildings on the Station.

Matanuska Station

At the Matanuska Sub-station, a garage-threshing shed with fireproof grain storage 44' x 64' in dimension and 2 stories in height is now under construction from Federal funds. It will provide space for storage of 10 units of automotive equipment. A 5500 feet radiation, low pressure steam boiler will provide heat for experimental research work in grain drying and hay drying. Space will also be available for drying, threshing, and processing grain and forage seed samples and for processing experimental samples of potatoes and other horticultural crops.

Petersburg Station

The sills, joists, and wooden floor of the cold storage room at the Experimental Fur Station at Petersburg were decayed and were replaced. A concrete foundation and floor should replace the wooden floor.

Federal Station, Palmer

At the Federal Station in Palmer, 2 four-bedroom and 5 two-bedroom houses have been under construction on contract. Also on contract and under construction have been a greenhouse of 5,600 square feet in area and an experimental vegetable storage building. It is expected that all of the buildings will be completed by July 1, 1951. The new laboratory office building was completed in May of 1950. Installation of permanent cabinets and fixtures in the laboratory rooms was completed during the current year.

FAIRBANKS EXPERIMENT STATION, 1950

REPORT OF THE SUPERINTENDENT

Station Improvements

Houses

Duplex. A furnace and stoker were installed under this building (located in the flat) to replace 2 oil heaters and to heat the building more uniformly.

Triplex. The middle apartment in this building had never been entirely finished, although occupied. Therefore, a pine wood floor was laid in the front room, base board and quarter round were put on, and linoleum was laid on the kitchen and bathroom floors.

Superintendent's house. A forced air system was installed on the existing furnace to achieve a more even distribution of heat. An oil hot water heater no longer needed in the messhall-dormitory was installed. Rotted floor boards were replaced in the bathroom, and the kitchen was renovated to include a large window and modern cabinets.

Farm foreman's house. Steam heat was set up for this house when the milk house was moved from its lower floor.

Experiment Station Plant

Dairy barn. The east wall of the cow barn from the floor to the bottom of the windows was replaced with a cement retaining wall and back filled. To meet Territorial health rules, a separate approach was built in with a trap door leading to the old furnace room, which is now available for storage. The milk room was renovated, and steam heat installations were completed in the room and throughout the barn.

Horticultural work room. The double garage under the granary was made over into a laboratory and work room for the Horticulture Department.

Silo pit. A removable wooden panel was constructed and fitted for the front of the trench silo.

Chicken coop. The hog house, at present unused, was converted and equipped for use as a poultry house until a new one can be constructed.

Well. The new well adjacent to the garage was completed and put into operation. This has since developed difficulties and will need further work.

Roads and land clearing. A road to the back fields, approximately 3/4 mile in length, was straightened, widened, graded, and installed with culverts to make the fields more readily available early in the spring. The largest of the fields (about 12 acres made accessible by this road was leveled enough with a bulldozer to facilitate later reclamation with Station equipment

New Construction

Garage and Threshing Shed

A new building (40' x 50') was constructed with the use of some materials salvaged from the old red barn; reenforcing steel, cement, and other materials obtained from Ladd Air Force Base salvage yard; gravel from the Alaska Road Commission (all of these at no cost to the Station); plus new materials purchased locally. It includes an 8-stall garage, a threshing shed and winter storage space (24' x 40'), and a fireproof grain storage room (6' x 11').

Power System

A 3-phase, 220-440 volt power line about 1¼ miles in length was built from the University and city power terminals to the Station and to the various buildings on the Station. This line makes it possible to operate electric motors and equipment which formerly were inoperative because of insufficient power. Approximately a thousand dollars' worth of new transformer and miscellaneous electrical equipment was transferred from the Ladd Air Force Base salvage yard at no cost to the Station and was used on these lines to help defray costs. Additional materials needed were purchased from local concerns

Salvage Sale

A sale of all obsolete, worn-out and surplus equipment was held in July on the Station grounds. It netted $1,302.00.

Equipment Acquired

New equipment was obtained as follows: an Allis Chalmers all-crop harvester, a rubber tired farm wagon, a liquid manure spreader, a power driven side delivery rake and tedder, a spike and spring tooth harrow, a Brillion grain drill, an electric gas pump and 1,000 gallon tank, an oxygen-acetylene welder, a drill press, and miscellaneous small tools. A 1½-ton surplus dump truck and a 1½-ton stake body were transferred from the Forest Service and Entomology Department, respectively. Purchased from Army surplus were a jeep and a 250-gallon water tank.

Needs of Fairbanks Station

Except for additional tools and automotive overhauling equipment, the most pressing needs at the Fairbanks Station have to do with repairs, conversions, and the provision of extra space for operations. Adequate office space and greenhouse space are needed. The old milk room should be remodeled either as laboratory or office space. The steam line should be extended to other buildings on the Station grounds to make full use of the boiler in the messhall. Reconstruction of the well should include a settling system, and a large concrete reservoir should be constructed for surface water storage for fire protection and general Station use. Walls and ceiling of the poultry house should be insulated. Landscaping of the Station grounds, planting ornamentals, and changing the drive-in road from its present location constitute a needed program for Station improvement.

General Farm Operations

Livestock and Poultry

On hand January 1, 1951, were 18 cows, 2 years old or older; 8 heifers, 8 months to 2 years old; 2 heifer calves under 6 months old; 4 bulls, 8 months to 2 years old; 2 bulls under 6 months old; 1 herd sire, 8 years and 9 months old; and 130 Rhode Island Red pullets, 6 months old.

Crops

The 1950 growing season started about 2 weeks earlier than usual, but was very dry. The combined precipitation for April and May was only 0.55 inch. Consequently, hillside seed beds were short of moisture. Plowing on the hillside started May 8, but the bottom land, where most of the grains were grown this season, was not dry enough to work until May 21. A lack of precipitation was especially noticeable in potatoes and pasture. Only 4.94 inches were recorded for the period June through September. This dry season proved ideal for grain planting and harvesting. Moisture percentages were very high, 18 to 20 percent, on grain harvested. Germination of all dried grain was high, some samples approximating 100 percent.

Approximately 31 acres were devoted to grain exclusive of experimental crops, pasture, oats-and-peas for silage, and permanent hay. With the exception of Khogot wheat, which was fertilized with 10-20-10 at the rate of 94 pounds per acre, these grain crops, seeded at the rate of 90 pounds per acre, were fertilized with 5-20-10 at the rate of 79 pounds per acre. Two acres of Edda barley seeded June 1 and harvested September 18 averaged 27 bushels per acre. Three acres of Olli barley seeded June 3 and harvested September 18 averaged 33 1/3 bushels per acre. Twelve acres of Gopher oats seeded June 6 and 7 and harvested October 3 and 4 averaged 38 bushels per acre. Khogot wheat seeded May 26 and harvested September 25 yielded 140 bushels for 7 acres.

MATANUSKA EXPERIMENT STATION, 1950

REPORT OF THE SUPERINTENDENT

The duties of the Superintendent at the Matanuska Station have been quite varied during the year 1950. He has endeavored to cooperate and work with the heads of the various departments in order to help in any way possible in carrying on their work. In doing this, it has been necessary to supply labor, equipment, and materials as required by them in carrying on their various projects.

With the exception of the new garage, all construction and maintenance work at the Station has been done the past year by regular Station labor. Securing the type of labor required has been a serious problem for some time. In the future this situation may become more acute. In view of this fact, anything that can be done for the convenience and improved working conditions of Station employees should not be neglected.

A great deal of the work in all phases of research carried on in poultry projects at the Station has been done by the Superintendent the past year.

A major portion of the Superintendent's work has been the physical maintenance and operation of the Station plant. This has been considered under the following headings:

Buildings and Grounds

New Garage and Work Room

Work was begun by the Davis Construction Company on the new garage with a threshing, drying, and work room on the second floor. Because of the fact that construction was begun late in the season, only the concrete work for the walls and ceiling of the first floor was completed. The remaining construction is to be finished in 1951.

Poultry House

A portion of the poultry house was remodeled under the direction of Mr. Branton, Agricultural Engineer. Four 10 by 13 feet pens were constructed. Pens 1 and 2 were ceiled with $\frac{1}{4}$-inch plywood. Vapor seal in the form of sisalcraft paper was placed under the plywood. Pens 3 and 4 were ceiled with native 1-inch rough lumber with a vapor seal under the native lumber. The walls were then filled with sawdust. Ventilation stacks were constructed for each pen. Pen 1 was equipped with an electric heater and forced ventilation, the latter by means of an exhaust fan installed in the exhaust stack. Pen 2 was not provided with any form of heat and had only natural ventilation. Pen 3 was without heat but was provided with an exhaust fan

for ventilation. Pen 4 was equipped with a butane gas hot water heater. A 50-feet coil of garden hose, run from this heater, circulates hot water through the litter on the floor of the pen. This is accomplished by a small electric pump.

In order to provide adequate current for the operation of electrical equipment in the poultry house, it was necessary to cut the supply line off from the Dairyman's Cottage and run a 220 volt line directly from the main supply line. A new Louden litter carrier was installed in the poultry house to facilitate cleaning.

Grain Drier

A 500-bushel capacity steel grain bin was purchased for the purpose of drying grain. This bin was assembled adjacent to the garage. The Palmer Sheet Metal Company constructed a hot air tunnel connecting the furnace in the shop to the grain bin.

Forage Sample Drier

The drier located in the milk house was completely remodeled. In doing this, it was enlarged and a new fan and drying unit were installed.

Upper Garage

A cement floor was poured in the west end of the upper garage. This space is being used by the Agronomy Department.

Garage and Shop

Some changes were made in the garage and work shop in order to accommodate new shop equipment. A heavy wire tool cage was made in the shop to permit more efficient handling of tools.

Barn

The interior of the dairy barn was repainted.

The hay drier in the barn was completely remodeled under the supervision of Mr. Branton, Agricultural Engineer. A large squirrel cage fan and a much larger radiator were installed. The radiator will be connected to a boiler in the new garage when completed. Larger air ducts were also installed in connection with the fan. The installation of a 3-phase motor to drive this fan made it necessary to run a 3-phase electric line to the barn. A separate meter was also installed to care for this motor.

Milk House

The interior of the milk house was repainted and another washing vat was installed.

In the afternoon of December 7, fire broke out in the milk house building. Prompt action on the part of the Station employees soon extinguished the blaze but not before considerable damage was done to the interior of the building and equipment. In order to make the milk room usable again, it was necessary to put in a new ceiling, paint the interior, and replace all the windows. The fire did a great deal of damage in the room occupied by the forage sample drier. This drier was left in ruins. It was deemed advisable to install an electric hot water heater for the milk room rather than go to the expense of replacing the burned controls to the boiler.

The power line serving the barn, garage, and root cellar became badly overloaded. In order to remove some of the load, a new line was put in to serve the milk house.

Water Heaters

Automatic oil hot water heaters were installed in the Kodiak Cottage, the messhall, Dairyman's Cottage, and Superintendent's Cottage.

Landscaping

Landscaping the Station grounds was begun under the direction of Dr. Myron F. Babb. A portion of this work was completed. A new entrance road was constructed, permitting the office to have a 30-feet lawn in front of the building. The south half of the lawn was tilled, leveled, and seeded to bluegrass with a cover crop of oats.

Equipment Acquired

General Farm Machinery and Equipment

A Ferguson tractor equipped with 2-way plow, spring tooth cultivator, tiller, tandem disc harrow (7 feet), middle buster, mowing machine, potato hiller, rear mounted hoist, and row marker was acquired. Other farm equipment obtained include 2 rubber-tired wagons; an 8-feet McCormick Deering tandem disk harrow; a McCormick Deering 2 (16-inch) bottom, 2-way, roll-over plow; an 8-feet McCormick Deering grain and fertilizer drill; a Brillion Sure Stand grass seeder, a 1½ ton Ford truck with stake body, an Eversman land leveler, and a power lawn mower.

Shop Equipment

Shop equipment acquired included an electric welder, an air compressor, a power hack saw, a skill saw, a 3/4-inch electric drill and drill press, an oxygen-acetylene welder with cutting attachments, and a hydraulic floor jack.

Departmental Equipment

A head thresher, a 22-inch plot thresher, and a germinator were acquired for the Agronomy Department. A Silver Prince sprayer was obtained for the Horticulture Department.

Needs of Matanuska Station

Equipment

Needs for general Station equipment have been taken care of fairly well. However, it might be desirable to obtain the following items if possible: an oil water heater for the Central Cottage, conversion of floor furnace in the office to a pipe furnace and installation of a stoker, an elevator for transferring coal from a railroad car to Station trucks, and a new grain separator. The office furnace conversion would make all the rooms comfortable to work in during severe weather, and the stoker would pay for itself in labor and coal saved. So far, search for a suitable coal elevator has been unsuccessful.

Repairs and Conversions

If the present plans for completion of the landscaping program are carried out, the appearance and convenience of the Station grounds will be greatly improved.

Certain buildings at the Matanuska Station are very badly in need of paint. The need is most critical on the messhall apartment building. The Kodiak Cottage should have a coat of shingle stain. The other buildings on the Station also need a coat of paint, but the need is not as great as for those mentioned. The office building interior should be redecorated.

The room in the milk house formerly occupied by the forage sample drier should be designed for the comfort and convenience of Station employees. Provision should be made for individual lockers, a table where lunches can be eaten, and a lavatory.

A new door arrangement might be effected in the upper garage to provide storage for 2 additional cars belonging to Station personnel.

General Farm Operations

Land Clearing

About 2 acres of land were cleared and plowed in the fall of 1950. This land will be made available to the Horticulture Department for small fruit variety testing, breeding, and culture.

Crops

The growing season for 1950 was unusually dry. Very little moisture was present in the ground at seeding time, and only 5.68 inches of precipitation occurred during the growing season of June, July, August, and September. This lack of moisture was most noticeable in vegetable crops and pasture. Dry weather continued on through harvest, making harvesting conditions ideal. Grain matured, was harvested, and threshed with but very little rain occurring during this period. Because of this, grain went into storage with a relatively low moisture content. Germination on all grain should be high.

Approximately 45 acres were devoted to regular field crops, exclusive of experimental crops, pasture, and permanent hay. These grain crops, seeded at the rate of 90 pounds per acre, were fertilized with 10-20-10 at the rate of 100 pounds per acre. Twelve acres of Khogot wheat, seeded May 17 and 18 and cut August 28, yielded a total of 268 bushels, or 24 bushels per acre. Gopher oats, seeded May 20 and cut August 30, yielded 50 bushels per acre or a total of 473 bushels for the 9.5-acre plot. Three acres of oats, seeded May 22 and cut September 6, yielded a total of 154 bushels or 51.3 bushels per acre. Seeded May 19 and cut August 15, Olli barley yielded 39.4 bushels per acre or a total of 375 bushels for the 9.5 acres cultivated.

Livestock and Poultry

On hand January 1, 1951, were: 19 cows, 2 years old or older; 14 heifers, 8 months to 2 years old; 4 calves, heifers; 11 calves, bulls; 1 bull, Guernsey, aged 5 years; 2 bulls, Holstein (borrowed); 2 bulls, Red Dane (borrowed); 2 draft horses, 14 years old; 118 hens, New Hampshire Reds, old; and 136 hens, New Hampshire Red, pullets.

The 2 draft horses should be disposed of in some manner. They are not physically fit to work, and the cost of keeping them is considerable, both from the standpoint of feed consumption and the man hours of labor required in caring for them.

PETERSBURG EXPERIMENTAL FUR STATION, 1950

REPORT OF THE SUPERINTENDENT

Improvements to Physical Plant

Several of the needed repairs listed in the report for 1949 have been accomplished.

In May, a man was hired to install the new linoleum tile on the floor of the office rooms, hall, and laboratory. There were not sufficient tile to complete the job entirely, but extra tile are ordered and will be installed as soon as they arrive. There is little enthusiasm about the technique employed by the man hired, as many of the tile have raised edges and are not firmly attached to the floor. This situation is being remedied, in part, by re-laying the individual tile as necessary.

Inlaid linoleum and a linoleum wall covering were put in the kitchen of the caretaker's residence. The new, oil-burning kitchen range was installed, and it was necessary to replace the toilet in this dwelling. The water supply into the building was protected from freezing by a sheet metal, iron shield.

Several rooms in the office-residence building were given a much needed coat of paint: the laboratory was painted with 2 coats of enamel; upstairs, the kitchen, living room, front bedroom, bathroom, and hall each had 1 coat. The drainboard in the kitchen was covered with inlaid linoleum, and a new sink rim was installed.

Four marten pens were built during the year, and repairs were made repeatedly on the other marten and fox pens in use. The wood has deteriorated and rotted to such an extent that constant surveillance is necessary to prevent the escape of animals.

During the latter part of the year, repairs were started on the foundation of the Station cold storage plant.

New Buildings

No new buildings were constructed at the Station during the past year. Station personnel completed the 7-car garage built last year; doors were hung; a large door was made from aluminum roofing for the stall where the dump truck is housed; and trim was put on the face of the building.

New Equipment

The following new equipment was acquired during 1950: an Olympic oil burning range, a Smith-Corona typewriter, a typist chair, an executive desk, a used Champion bread mixer and parts, and small hand tools costing approximately $50.

Needs of Petersburg Station

Equipment

There has been correspondence relative to the items listed in the report for 1949, but definite plans have not been made for their accomplishment. It is felt that the following suggestions are still of the utmost importance.

Water system. This Station has needed an adequate, sanitary water system for some time. Numerous requests and reports have been made on the present system during the past 9 years. The supply is limited, the pressure low. The well is very poorly cribbed with poles. Surface water can get into the well, and the water contains a precipitant which forms in the pipes resulting in dirty water, low pressures, and periodic pipe replacements.

Mink house. Very little work has ever been carried on at this Station on various methods of housing mink. The old mink house is too small to provide adequate housing during the summer months. Funds are requested to purchase materials for the construction of a 50- to 100-pen mink house. These pens would be small, inexpensive, and incorporate the features of modern mink pens now being constructed in the States.

Repairs

Due to inclement weather, repairs on the cold storage plant foundation were suspended. Repairs have progressed to the point where the foundation is no longer dangerous, and they will be completed when weather permits.

Authorization has been given to improve the Station water system, insulate the ceiling and wall of the cold storage plant, and paint the Station buildings. These repairs will be made when labor is available, materials are obtained, and the weather is more favorable.

The present marten and fox furring pens should be replaced as soon as possible. Authorization for rebuilding of these pens has been granted.

Animals on Hand as of December 31, 1950

Pelting was not completed until January 11, 1951. The following numbers of animals were kept over for breeding purposes.

Foxes	Mink	Marten
6 Blue	101 Dark	43
4 Mutation blue	3 Platinum	
10 Half mutation	5 Half platinum	
3 White	3 Pastel	
6 Silver	12 Half pastel	
29 Total	1 Black Cross	
	4 Wild caught	
	129 Total	

Animals Pelted for Sale During the Year

Foxes	Mink	Marten
70 Blue	195 Dark	1
13 Mutation blue	4 Pastel	
3 White	3 Platinum	
8 Silver	202 Total	
94 Total		

According to available information, none of the pelts has been sold as yet. Four live foxes were purchased by Dr. J. R. Gorham, Veterinarian in Charge, Fur Animal Disease Research Laboratory, Pullman, Washington, and were shipped to him on January 28, 1951. Dr. Gorham will not have funds available until April 1, so payment will be made after that date. These animals were in addition to the 29 foxes kept as breeders.

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-1

2. DIVISION: Alaska Agricultural Experiment Station

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Soil Classification, Mapping and Management Research in Alaska

5. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

6. SUPERVISORY LEADER: Allan H. Mick

7. LOCATION: Alaska Agricultural Experiment Station, Palmer, Alaska

8. COOPERATION: Soil Conservation Service (participated in mapping); Agronomy Department (participated in forage fertilizer studies); Animal Husbandry Department (participated in forage studies); Horticulture Department (participated in potato studies); University of Nebraska (cooperated in Manganese studies); Anchorage Potato Chip Company (participated in potato quality studies).

9. OBJECTIVE OF CURRENT WORK: To classify and inventory soil resources in the Matanuska and Tanana Valleys, and in selected sites on the Kenai Peninsula (Homer, Kenai, Fritz Creek, Ninilchik); to develop or adapt rapid analytical techniques for anticipating nutrient amendments for soils in the afore-mentioned areas; to investigate fundamental physical and chemical characteristics of Alaskan soils; to investigate the field response of forage, grains and potatoes to fertilizer amendments, including minor elements.

10. PROGRESS DURING THE YEAR: Soil Classification (1) in the Matanuska Valley (AL-1-1-1): 28,000 acres surveyed; (2) in the Tanana Valley (AL-1-1-2): 7,000 acres surveyed; (3) exclusive of Matanuska and Tanana Valleys (AL-1-1-3); reconnaissance study through Copper Center area. Rapid soil analysis (AL-1-1-4): 243 samples analyzed. Chemical characteristics (AL-1-1-5): progress limited to planning. Physical characteristics (AL-1-1-6-1): Physical analysis reveals loessial materials in Matanuska Valley are dominated by fine silt, 20-44 microns in diameter. Mineralogy (AL-1-1-6-2): Bodenburg series found to be dominated by volcanic glass. Fertilizers for small grains (AL-1-1-7): Fertilizer trials revealed 15-30-0 (N-P_2O_5-K_2O) pounds per acre to be an efficient fertilizer for cereal grains on Knik soils. Fertilizers for forage (AL-1-1-8): Yields of bromegrass directly proportional to amount of N

applied up to and including 128 pounds per acre, with no deterioration in quality. Alsike clover responded to N and P_2O_5; lime gave no response; heavy potash applications reduce yields. No treatment contributed to winter survival. All plots being entirely winter-killed. Response of oats to manganese (AL-1-1-9); 50 to 100 pounds per acre of $MnSO_4$ controlled foliar symptoms of Mn deficiency in Climax oats. Yields of grain and forage were correspondingly increased. Minor elements (AL-1-1-10); Minor elements did not influence yields of truck on Knik soils. Pot-testing (AL-1-11); Nitrogen and phosphates must be supplied in fairly large quantities to most soils. Potash supplies are nearly adequate, as are calcium and magnesium. Publication of results limited to a circular on fertilizer recommendations.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK:
Method of increasing forage yields has reduced the land requirements of livestock and dairy enterprises. Soil surveys yield information concerning economic land utilization and the feasability of extending research results into unsettled areas. For the most part, work under this project has barely started. Cessation at this time is unjustified, considering the overall agricultural program in Alaska.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR:
Soil surveys will be continued in:
The Matanuska Valley (AL-1-1-1)
The Tanana Valley (AL-1-1-2)
Elsewhere in Alaska as the opportunity arises (AL-1-1-3)

Development of rapid analytical techniques will be stressed (AL-1-1-4) supplemented by pot-testing (AL-1-1-11) as facilities become available. Laboratory investigations into the chemical (AL-1-1-5) and physical (AL-1-1-6-1) characteristics of important soil series will be expanded, field plot studies dealing with the fertilizer requirements of forage (AL-1-1-7), potatoes (AL-1-2-7), and grains (AL-1-1-8) will be expended to the limit of land and labor at hand. Field studies of responses to minor elements including manganese for oats (AL-1-1-9), and manganese, copper, boron, iron, zinc, and sulfur for truck and legume crops will be continued.

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
In cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-1 (F)

2. PROJECT TITLE: Soil Classification and Mapping in the Matanuska Valley.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATION: Palmer, Alaska

6. COOPERATION: None

7. OBJECTIVE OF WORK: To complete a survey and make maps available which summarize the distribution features of a soil classification based on proved criteria. These maps will serve as a basis for study, and for devising and recommending suitable land use management practices.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Extension of survey into areas not yet under cultivation, with particular stress on the Wasilla-Pittman area where recent road construction has opened large acreages of previously inacessible land.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Because of the fragmentary evidence thus far available, no direct public benefits can as yet be attributed to this work. Indirectly, the survey is basic to other Experiment Station projects. It has revealed that: (a) Important agricultural enterprises in the Matanuska Valley are chiefly supported by 2 mineral series, Knik and Bodenburg. (b) Successful farm enterprises are supported by deep phases of these 2 series; shallow phases support part-time enterprises and constitute a major portion of land now available for homesteading, that is for expansion of agriculture within the valley. (c) Because of drainage problems, organic soils remain marginal in character. Drainage problems, are acute to the extent of eliminating use of organic soils until local demand for produce make their exploitation economically feasible. (d) In all probability, the results of technical studies on the important mineral soils are interchangeable in application. Indirect benefits to local agricultural enterprises have thus accrued from this work insofar as the results of studies undertaken in other

agronomic projects have been extended in the form of specific recommendations concerning fertilizer practices, crop adaptations, and related infromation.

10. PROGRESS DURING THE YEAR: A total of about 28,000 acres in the western portion of the Matanuska Valley were classified and mapped during the summer of 1950. About half of this acreage extends from Goose Bay northeast along Cook Inlet through Knik. The remainder lies between Pig (Fish) Lake and the Little Susitna River to the north and east to Pittman on the railroad. The accepted soil legends were revised to recognize and define the more definite glacial features of the landscape and shallower more severely weathered profiles developed in what appears to be a sandy calcareous reworked drift.

11. PUBLICATIONS: Publication of maps, except in preliminary form and limited number, is not justified at this phase of the work. See paragraph 10. Evidence obtained from this project make possible the publication of Circulars 13 and 14, dealing with fertilizer recommendations and adapted crop varieties.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-2 (F)

2. PROJECT TITLE: Soil Classification and Mapping in the Tanana Valley.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATION: Palmer, Alaska

6. COOPERATION: Soil Conservation Service

7. OBJECTIVE OF WORK: To complete a survey and make maps available which summerize the distribution based on proved criteria. These maps will serve as a basis for study, and for devising and recommending suitable land use management practices.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Collating field notes and assembling data into maps. Field work will be held to a minimum, consisting mostly of reconnaissance studies in areas adjavent to that mapped during the current season.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Because of fragmentary data now available, no direct public benefits can as yet be attributed to this work. Indirectly, this survey is basic to other Experiment Station projects because it will reveal fundamental relationships determined by the geographic distribution of potential agricultural sites in the Tanana Valley. The classification is necessary to an intelligent application and extension of all agronomic research results. Indirect benefits to local enterprises have thus accrued from this work, insofar as the results of studies undertaken in other egronomic projects have been extended and applied in the form of specific recommendations concerning fertilizer practices and related information.

10. PROGRESS DURING THE YEAR: Field mapping was coordinated with the Soil Conservation program. Neil Michaelson accompanied the Soil Conservation Service field crew of 5 men who mapped the Fairbanks Soil Conservation Subdistrict the vicinity of and including Fairbanks. This area comprises 8 townships, consisting of a rectangle extending 24 miles east and west and 12 miles north and south, bounded roughly on the south

by the Tanana River. In this area, Mr. Michaelson mapped approximately 7,000 acres and in addition, inspected the work of the Soil Conservation Service crew in order to correlate their work with the national classification system. Field notes, based on a legend following the national system, are therefore now available covering the entire agricultural district in and around Fairbanks.

11. PUBLICATIONS: Evidence obtained from this project made possible the publication of Circulars 13 and 14, dealing with fertilizer practices and adapted crop varieties.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-3 (F)

2. PROJECT TITLE: Soil Classification and Mapping in Alaska Exclusive of the Matanuska and Tanana Valleys.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATION: Palmer, Alaska

6. COOPERATION: None

7. OBJECTIVE OF WORK: To classify soils in Alaska, exclusive of the Tanana and Matanuska Valleys, preparatory to organizing soil categories under the national system of classification.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Continuation of studies when and where an opportunity is presented. This work will be accomplished in conjunction with travel for administration or other purposes; or in conjunction with other agency projects.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Indirect benefits to local agricultural enterprises have accured from this work insofar as t e results of studies undertaken in other agronomic projects have been extended and applied in the form of specific recommendations concerning fertilizer practices, crop adaptation, and related information.

10. PROGRESS DURING THE YEAR: Little effort was expanded on this project. A single reconnaissance trip along the road through Copper Center and thence to Valdez afforded an opportunity to study several profiles and the present soil classification legend.

11. PUBLICATIONS: Limited to interdepartmental and inter-agency reports. Evidence obtained in the project indicates that information Circulars 13 and 14, dealing with fertilizer recommendations and adapted crop varieties, can be extended to these areas.

ALASKA AGRICULTU AL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-4 (H)

2. PROJECT TITLE: Alaskan Soil Fertility Levels as indicated by Rapid Soil Analysis.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATION: Palmer, Alaska

6. COOPERATION: Extension Service and Soil Conservation Service

7. OBJECTIVE OF WORK: To adapt recognized rapid analytical techniques to Alaskan soils in an effort to develop a method of predicting nutrient deficiencies under field and greenhouse conditions.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Field fertilizer trials with small grains, forage, potatoes, and vegetables on representative soil series will again provide an opportunity to correlate actual yields with values obtained from rapid analysis of carefully selected soil samples. Extracts other than dilute sodium acetate will be employed and compared. Nitrogen, phosphate, potash, calcium and magnesium levels are to be studied.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF T IS WORK: Because of widespread popular misunderstanding and a lack of application of soil testing, the value of soil test information is exaggerated. Some Alaskan farmers send soil samples to commercial laboratories in the States and follow recommendations that do not agree with experience or research results obtained in Alaska. A local soil testing program is urgently needed, not only to supply information concerning proper soil management practices but to correct misunderstandings that have resulted from an over-extension of experience accumulated in other climates.

10. PROGRESS DURING THE YEAR: A total of 243 samples were analyzed in early spring, employing the procedures and facilities developed during the previous year. Test results including estimates of available nitrogen, phosphates, and potash; pH values were also determined.

The results of these various "tests" were interpreted in terms of fertilizer recommendations and returned to 86 cooperating farmers and gardners through the Alaska Extension Service and the local Soil Conservation organization.

Analytical work was not resumed after the growing season until facilities became available in the new Palmer laboratory in early October. From then until the close of the year, effort was focused on the refinement of techniques made possible by new facilities and equipment. Sample analysis is to be resumed early in 1951 after a satisfactory research pattern has been established.

11. PUBLICATIONS: Information accumulated in this project has been intergrated with field trial results. The results, in terms of specific fertilizer recommendations for important Alaska crops, have been published as Circular 13 "General Recommendations, Fertilizers for Alaska, 1951".

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-5 (F)

2. PROJECT TITLE: Fundamental Chemical Characteristics of Alaskan Soils

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATIONS: Matanuska Experiment Station. Data from sites and samples representing important agricultural soils in Alaska.

6. COOPERATION: Horticulture, Agronomy and Animal Husbandry Departments

7. OBJECTIVE OF WORK: To describe Alaskan soil categories in terms of base exchange characteristics and other chemical properties of agricultural significance.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Depends upon laboratory facilities and technical assistance. If conditions are favorable, base exchange studies will be initiated.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Suitable laboratory facilities became available in the new Palmer building October 1. A laboratory technician reported for duty on November 1 and has since been employed in plant analysis. No important contributions have resulted from this work, which has barely progressed beyond the planning stage.

10. PROGRESS DURING THE YEAR: Progress was limited to the procurement of equipment and supplies, and technical assistance. A procedure for analyzing base exchange characteristics has been outlined.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL GRANT-PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-6-1 (F)

2. PROJECT TITLE: Fundimental Physical Characteristics of Alaskan Soils

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: Allan H. Mick, Paul F. Martin

5. LOCATIONS: Palmer, Alaska. Laboratory studies of samples collected throughout the Territory.

6. COOPERATION: Soil Conservation Service (sample collection)

7. OBJECTIVE OF WORK: To find a solution to problems of low soil temperatures and low moisture supplying capacities during the growing season.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Physical analysis of representative samples of agricultural soil series and analogous undistrubed profiles to discover the (1) fundamental pore size and particle size distributions, permeability, organic matter content, and moisture and aeration relationships; (2) changes brought about in these characteristics by current clearing and management practices, and (3) practical modifications of current practices that will increase yields and preserve the soil as natural resource.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Low soil temperatures, impeded drainage caused by peculiar pore size distributions and persistant frost, and low moisture retaining capacities are several factors that limit yields in many Alaskan soils. Except for particle size analysis of several samples collected by Bennett and Rice in 1913 and a few samples studied by Rockie in 1950, no work has been accomplished in this field. Opportunities for public assistance are great, especially in devising effective management practices.

10. PROGRESS DURING THE YEAR: An observational trial started last year to study the effect of black paper mulch on heat absorption was continued. When established, the paper mulch in early summer after all subsurface frost had disappeared and the surface layers had warmed. During the remainder of the season, soil under the mulch

remained 2° to 2.5° C warmer than adjacent unmulched areas. The next spring, however, the mulched plots did not thaw nor drain as rapidly as the neighboring untreated areas. From April until September they were from 2° to 3° C colder. The effectiveness of the black paper was decreased by a layer of dust blown over it during the winter.

Other physical aspects of soils studies during the reporting period included a continuation of particle size analysis, and measurements of organic matter and moisture relationships.

Particle Size Studies Complete physical analysis of 22 samples from successive depths of a representative Bodenburg profile shows that the surface mantle at this particular site is dominated by silt (60 to 70 percent of each subsite sample by weight). Within the silt separate particles ranging from 20 to 44 microns in diameter account for 80 to 90 percent of the total. Although the clay fraction increases with depth, it does not exceed 7 percent of any sample. Less than 2 percent of these samples exceeded 100 microns in diameter. Organic matter accounted for an average 5 percent of sample weight, and was not uniformly distributed vertically through the loessial mantle.

Organic Matter Because only small quantities of free carbonates and hydrated minerals are found in Alaska soil materials, total loss on ignition provides a fairly good estimate of organic matter. Over 100 samples subjected to ignition loss measurements gave results that conform to experience elsewhere. Soils of the Bodenburg series are inherently gray and therefore appear to contain more organic matter than can be extracted by quantitative techniques. Several zonal profiles from the Tanana Valley were characterized by vertical distributions of organic matter resembling typically podzolized soils. Catena relationships resemble normal family groupings found elsewhere in the northern hemisphere.

Moisture Equivalents A centrifuge method was devised for measuring and comparing the moisture equivalents of Alaskan soils and soil materials. Based on a procedure described in Public Roads (12;204-205, 1931), this method reveals no departures from established concepts as far as centrifuge moisture equilavent values are concerned. These values for Alaska resemble similar values for loessial mantles in the Mississippi River area and in Europe.

In addition to the studies described above, preliminary work was started on the possible use of coal wastes as soil amendments. Large quantities of coal screenings are available at the Jonesville mines in the Matanuska coal reserves. The black color of this material, together with its low cost, may offer a practical means of darkening surface soils and thus increase their absorption of solar radiation. Simulated weathering did not effect the physical characteristics of coal screenings. They can be expected to remain unchanged by wetting and drying, freezing and thawing, and heating and cooling. The second phase of this study will deal with the carbon:nitrogen ratio and the influence of large quantities of coal on the chemical and fertility characteristics of soil.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-6-2 (F)

2. PROJECT TITLE: Fundamental Physical Characteristics of Alaskan Soils (Mineralogy)

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: Allan H. Mick

5. LOCATION: Palmer, Alaska

6. COOPERATION: Geology Department, University of Alaska

7. OBJECTIVE OF WORK: To investigate the mineralogy of Alaskan soil materials; to relate mineralogical characteristics to particle-size moduli.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Mineralogic analysis of selected representative profiles, studies in AL-1-1-6-1. Specific gravity and petrographic separations will disclose the nature of nutrient carriers. Phosphate and minor element minerals, together with calcium and magnesium minerals, are of particular interest.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Exploratory work now under way discloses that an abundance of micaceous and glassy particles containing occluded calcium and magnesium are the probable source of basic elements in the Matanuska Valley soils. Additional work of this kind will assist in devising profitable management practices.

10. PROGRESS DURING THE YEAR: Three selected samples from a representative Bodenburg site were petrographically analyzed. Their mineral constituents were identified and random samples of about 1000 particles were counted. The results clarify and amplify the early (1913) work of Fry in this field. A summary is tabulated below:

Sample	Description and constituents in percent		
Number	2C	2E	7D
Depth, inches	8	8	12
Size, fraction, microns	44-74	74-105	149-177
Constituents			
Feldspars	8	1-	2-
Quartz	None	6	None
Volcanic glasses			
Femic	10	21	21
Salic	82	68	71
Other	1	4	4-

Unbiased petrography technicians emphasize that these samples appear to be relatively fresh, air-transported volcanic ash of recent origin. The principle constituents are described as follows:

Feldspars Unweathered angular particles of sanadine and soda orthoclase. Poorly crystallized cleavage fragments with platy development. Gaseous inclusions are common. Likely composition (K, Na) Al Si_3 O_8; sharp edges promote fairly rapid solubility.

Femic glass Dark rounded globules and granules containing an abundance of crystallites, probably ferromagnesian in character. Varies from andesitic and gabroic to dioritic. Unweathered. Approximate chemical composition:

SiO_2	47%	CaO	11.0
AlO_3	18%	Na_2O	2.0
Fe_2O_3	3%	K_2O	1.0-
FeO	7%	MgO	7%

Salic glass Clear to amber angular, rough, or hackly fragments exhibiting well developed parting and granulation due to internal fracturing. Weathering and corrosion uncommon. Margins sharp. Granitic to syenitic in character:

SiO_2	70%	Na_2O	4%
Al_2O_3	13%	CaO	1%
Fe_2O_3	1-%	MgO	2%
FeO	2%	K_2O	6%

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-7 (F)

2. PROJECT TITLE: Fertilizers for Small Grains

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: A. H. Mick, S. C. Litzenberger

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Agronomy Department

7. OBJECTIVE OF WORK: To study the responses of cereal grains to nutrients added in the form of concentrated carriers. Responses are to be judged by yields and quality.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Study on the Knik soil series will be continued. Several outlying soil series will be incorporated into this study if labor, equipment, and transportation are available.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: All evidence indicates that not only yields of cereal grains but also quality factors can be improved by proper use of fertilizers.

10. PROGRESS DURING THE YEAR: In addition to the randomized trials conducted at the Matanuska and Fairbanks Experiment Stations (see report of the Agronomy Department), observation of variety trials on new and old fields throughout the Territory show that site conditions determine the fertilizer requirements of cereals. New fields in particular require large amounts of fertilizer.

11. PUBLICATIONS: Information from these studies was incorporated in Circular 13 dealing with fertilizer recommendations.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL GRANT-PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-8 (F)

2. PROJECT TITLE: Fertilizers for Forage Crops

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: Allan H. Mick, H. J. Hodgson

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Agronomy Department

7. OBJECTIVE OF WORK: To investigate the influence of nutrients added in the form of concentrated carriers on the yield, winter survival, and chemical composition of forage crops; to determine the effect of various fertilizer ratios on the botanical composition of grass-legume associations; and to measure the effect of rates and date of application on the seasonal production of forage.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Continuation of work started in 1949 with bromegrass, bromegrass-legume mixtures, and the winter-survival of alsike clover. Heavy applications of nitrogen will be made on bromegrass to determine the point diminishing returns. Interactions of phosphate and potash on the yields of bromegrass will also be continued.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS PROJECT: Fertilization of bromegrass has yielded profitable returns in both wet and dry seasons. By good management pasture and hay yields can be increased 7- or 8-fold. By using fertilizers farmers can grow protein more economically than they can buy it.

10. PROGRESS DURING THE YEAR: Promising results were again obtained with bromegrass which is well-adapted to the Matanuska Valley environment. Bromegrass responds well to fertilizers in both wet and dry seasons. Other phases of this work included evaluation of the winter-survival of alsike clover and observations of carry-over effects of sulfur on clover.

Second-year responses of bromegrass to fertilizers Field plots laid out and fertilized in 1949 were again fertilized according to the

original plan. Responses, measured in terms of yields and quality, are tabulated below:

Second-year response of Bromegrass to fertilizers. Matanuska Experiment Station, 1950. Dry matter yields and percent of protein in dry matter.

Treatment Pounds per acre of nutrients as indicated	Yields and quality when harvested as - - Pasture (3 clippings) Pounds per acre	Percent protein	Hay (2 clippings) Pounds per acre	Percent protein
Response to nitrogen (Values are means of 12 plots				
None	806	11.5	714	8.7
16	1118	10.7	1158	8.6
32	1394	12.2	1526	8.3
32 & 32*	2076	12.9	2270	7.8
64	2178	14.8	2844	9.5
64 & 64*	2930	16.6	4114	9.4
128	3012	20.8	3818	12.2
Response to phosphate and potash (Values are means of 28 plots)				
None	1516	16.2	1434	11.3
40 - 20	1940	15.4	2528	9.4
80 - 40	2336	15.2	3054	9.4
Maximum yields (Values are means of 4 plots)				
128-80-40	3892	17.2	5245	11.5
64 & 64-80-40*	3735	11.8	5860	6.4
Minimum yields (Values are means of 4 plots)				
None	660	6.4	680	5.5

* Split nitrogen application, half applied in early spring, half in early summer.

High nitrogen applications for bromegrass Because of the linear response of bromegrass in the above study, heavy applications of nitrogen in combination with 2 levels of phosphate and potash were topdressed on a uniform bromegrass sod. Under the conditions prevailing this season these different treatments did not result in yield differences. No interactions between nitrogen, phosphate, and/or potash proved significant.

Influence of sulfur on the yields of alsike clover Differential winter killing of legume stands on these plots prevented quantitative measures of second year responses. No relation was apparent between sulfur treatments and winter survival.

Influence of fertilizers and lime on the yields and winter survival of alsike clover During the winter of 1949-50 the stands established on these plots entirely winterkilled. Early spring observations revealed no differences in winterkilling directly attributable to fertilizer treatment or to liming.

Influence of fertilizer on native "hayflat" sedges A randomized study showed some response to nitrogen and slight response to phosphate. This investigation was not conclusive because treatments were confounded by inequalities of drainage and other site factors not anticipated.

11. PUBLICATIONS: Results were integrated in Circular 13 dealing with fertilizer recommendations.

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ANNUAL PROGRESS REPORT, FEDERAL AND FIDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-9 (P)

2. PROJECT TITLE: The Response of Oats to Manganese Applied in Fertilizers

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: Allan H. Mick, Neil Michaelson

5. LOCATION: Matanuska Experiment Station, Matanuska Valley

6. COOPERATION: Agronomy Department, University of Nebraska (informal)

7. OBJECTIVE OF WORK: To discover the quality and yields of oats grown on Alaskan soils of different fertility levels are influenced by applications of manganese carriers.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Observational only, to include a survey of varieties grown on various sites and conditions. Not all varieties are equally susceptible to manganese deficiency. Two new varieties introduced this year by the Agronomy Department, may be subjected to small tests to determine their susceptibility.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Deficiency symptoms were alleviated and yields increased by applications of 100 pounds of manganese sulfate.

10. PROGRESS DURING THE YEAR: Three phases were involved in this season's work. These included (a) statistical study of the 1949 yield data, laboratory examination of soil characteristics and correlation of the information so obtained; (b) evaluation of residual effects noted early at the 1949 site; and (C) a field study of manganese versus oats grown on another soil series, Knik loamy silt, at the Matanuska Experiment Station.

Evaluation of the 1949 experiment Application of 50 to 100 pounds per acre of manganese sulfate (80%) either reduced or controlled foliar deficiency symptoms commonly exhibited by Climax oats in the Matanuska Valley. Manganese applications increased both oat grain and hay yields. Increases in grain yields varied from 10 to 30 bushels per acre; in other words, at current prices, $3 worth of manganese fertilizer increased

acre returns from $20 to $60. Hay yields were likewise increased by manganese treatments. Magnitude of these increases are indicated by yields ranging from 16 bushels per acre (2.6 tons of dry hay) where no fertilizer was applied to a maximum of 89 bushels per acre (3.9 tons of hay) from plots receiving 100 pounds of manganese sulfate, 50 pounds of nitrogen, and 40 pounds per acre of potash.

In this study, large economical yield increases were obtained from nitrogen applications of 30 to 50 pounds per acre. Phosphate (at the rate of 80 pounds per acre of P_2O_5) also increased yields, especially when applied with nitrogen and potash. Potash did not increase yields, either when applied alone or in combination with nitrogen, phosphate, and/or manganese. Heavy nitrogen applications resulted in severe lodging, an effect that was counteracted by phosphate. Grain yields were increased more than forage yields by nitrogen fertilizers. Nitrogen and phosphate together, but without manganese, effectively decreased "gray speck" symptoms.

Statistical analysis revealed significant second-order interactions between nitrogen and phosphate, and significant third-order interactions between nitrogen, phosphate and potash. The maximum response to nitrogen, phosphate, and potash was obtained in the presence of the other 2 nutrients; likewise the greatest response to manganese was obtained when the 3 major nutrients were present. Complete fertilizers including manganese produced the highest quality grain as indicated by test-weight values.

Soil studies showed a relatively uniform distribution of manganese throughout the plow layer and a uniform vertical distribution at several representative site profiles. Standard extraction procedures yielded fairly large quantities of soluable manganese. The microbiological population of the soil proved similar in number and kind to those found in more southerly latitudes. It is therefore concluded that manganese starvation is probably physiological in nature, aggravated by low temperatures, alkaline soil reaction, and low fertility levels.

Residual effects. The field discussed above was planted to Trapmar barley this year, no fertilizer being applied. In early June the entire treatment pattern of the previous season was evident in growth differences exhibited by the barley. These differences persisted throughout the summer and afforded an opportunity to assess the residual effects of manganese on barley. Statistical analysis of yield data revealed that none of the carry over effects could be attributed to manganese. No interaction between manganese and the major nutrients was revealed, nor were these significant interactions among the residual effects of nitrogen, phosphates, and potash. The entire residual effect was segregated as a phosphate main effect, the extent of which is shown in the tabulation below:

1950 Barley Yields, Average of 72 Plots

Treatment in 1949	Bushels per acre	Pounds per bushel	Pounds per acre	Increase
80 pounds of phosphate per acre	40.7	58.6	2389	146%
No phosphate	29.6	55.2	1633	100%

1950 Field Study. A 6x6 Latin square compared 3 levels of manganese (0,200 and 400 pounds of manganese sulfate per acre) and 2 levels of sulfur (0 and 2000 pounds per acre). These treatments were superimposed on a basic overall fertilizer (10 pounds of nitrogen, 40 pounds of phosphate, 10 pounds of potash per acre) applied to Gopher oats planted on a representative Knik loamy silt site.

No differences due to treatments were observed during the growing season. Manganese deficiency symptoms did not develop in this field nor on other adjacent fields this season. A contributing factor was low soil moisture which limited crop growth to a greater extent than low fertility levels. That treatments did not result in significant growth differences was confirmed by statistical analysis of the data. No variations were found in green or dry forage weights nor in green yields or grain quality. Grains yields averaged 50 bushels per acre with an average test weight of 42.6 pounds per bushel at 11% moisture.

11. PUBLICATIONS: Information included in Circular 13, dealing with fertilizer recommendations.

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
In cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AI-1-1-10 (1)

2. PROJECT TITLE: Minor Elements, Exclusive of Manganese

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: Allan H. Mick, W. M. Laughlin

5. LOCATIONS: Matanuska and Tanana Valleys

6. COOPERATION: None

7. OBJECTIVE OF WORK: To discover the response of crops to treatments involving minor elements.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Response of certain "indicator" crops (celery, carrots, onions and cauliflower) to treatments of copper, boron and zinc. Basic treatment of N, P_2O_5, K_2O and manganese will insure that these nutrients do not limit growth. Influence of minor elements on winter survival of alsike is to be continued.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: In the United States, Canada and in parts of Europe, minor elements have limited production of important crops. Applications of small quantities of minor element fertilizer materials have proved profitable. In view of the nature of Alaskan soils, particularly with regard to their alkaline characteristics, minor elements may prove effective in increasing yields and in improving quality. They may be expected to assume more conspicuous roles as farming practices become more intensive.

10. PROGRESS DURING THE YEAR:
Vegetable crops. Four minor element treatments replicated 6 times were applied to the soil at both the Matanuska (Bodenburg and loamy silt) and Fairbanks Stations (Fairbanks silt loam). At both locations head lettuce (Corell #456), onions (Michigan Short-Season Yellow Globe), and carrots (Red Cored Chanteray) were planted as assay crops. Dill (Mammoth) and endive (Deep Heart Fringed) were planted for observation purposes. At the Matanuska Station cauliflower (Snowball) and celery (Utah) were also grown. A basic fertilizer treatment included nitrogen, phosphate, and potash. Minor element treatments and application rates

were as follows:

Element	Carrier	Pounds per acre
Iron	Ferrous sulfate	100
Manganese	Manganese sulfate	400
Boron	Borax	25
Copper	Copper sulfate	100
Zinc	Zinc sulfate	25

No data was secured at the Fairbanks Station because unusually dry conditions prevented seed germination. At the Matanuska Station manganese and boron applications were excessive as indicated by early growth retardation and marginal foliar yellowing of all crops but onions. The cauliflower leaves on boron and manganese plots were deformed, appearing "boat shaped". No minor element plots appeared superior to untreated plots in the field. Tabulated below are yields measured during harvest. No minor element significantly increased yields of any crop; nor was there any observable quality improvement caused by minor element fertilization.

Effect of minor elements upon total weight harvested, mean yields in tons per acre, average of 6 replications.

Treatment	Lettuce	Carrots	Celery	Onions	Cauliflower
Fe	15.4	13.3	11.4	1.7	5.3
Mn	14.1	14.2	11.1	1.4	3.0
None	16.3	14.9	11.4	1.7	4.7
B	15.7	11.3	11.7	2.0	4.9
Cu & Zn	14.2	12.8	11.6	1.5	4.2

Analysis of variance

		Lettuce		Carrots		Celery		Onions		Cauliflower	
Source	DF	SS	MS	SS	MS	SS	MS	SS	MS	SS	MS
Total	29	106		161		73		47		34	
Treatments	4	23	6*	46	12*	1	1.4	1	0.3	19	4.8
Replications	5	46	9	36	7	32	6.5	32	6.4	9	1.8
Error	20	37	2	79	4	40	2.0	14	0.7	6	0.3

Least significant difference

At 5%	1.6		2.9			0.7
At 1%	2.2		4.4			0.9

Alsike clover. A field experiment was conducted to test the influence of minor elements on the winter survival of alsike clover growing on Knik loamy silt. Designed as a ½ replicate of a 2^6 factorial in 2 blocks of 16 plots each, each plot received overall uniform fertilizer application of nitrogen and potash. Superimposed on this basic treatment were the following comparisons, and in combination:

Elements	Carrier	Pounds per acre
Manganese	Manganese sulfate	400
Boron	Borax	25
Copper	Copper sulfate	100
Zinc	Zinc sulfate	25
Sulfur	Sulfur	2000
Phosphorus	Treblesuperphosphate	350

Alsike clover was planted in rows to facilitate weed control. Field observations indicated that manganese and boron in the amounts used interfered with germination and leaf discoloration; plants on these plots were somewhat stunted. By harvest time, however, no visual differences were apparent between plots. Quadrats were cut by hand, weighed and dried, and the following comparison obtained:

Effect of Minor elements main effects on the yield of alsike clover foliage. Values are averages of 16 plots, in pounds of dry matter per plot.

Treatment	Yield	Treatment	Yield
Manganese	2.86	Boron	3.01
No manganese	3.45	No boron	3.30
Zinc	2.95	Phosphate	3.41
No zinc	3.36	No phosphate	2.90
Copper	3.16	Sulfur	2.94
No copper	3.15	No sulfur	3.37

None of the 4 minor elements increased yields. A significant increase is attributed to phosphate. Winter survival data will be collected in 1951.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-1-11 (F)

2. PROJECT TITLE: Alaska Soil Fertility Levels as Indicated by Pot-testing Techniques.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER: W. M. Laughlin

5. LOCATION: Matanuska Experiment station

6. COOPERATION: None

7. OBJECTIVE OF WORK: To develop a method of predicting nutrient deficiencies in Alaskan soils and to determine if and what inherent deficiencies exist in important agricultural sites and soils.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: If greenhouse facilities become available, this technique will be applied to several agricultural sites and representative soils.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: In certain western states, pot-testing techniques yield better prediction information than rapid chemical tests. Pot-testing results may be useful in Alaska.

10. PROGRESS DURING THE YEAR: A small experiment in 2 phases was conducted with leaf lettuce (Paris). In the first phase, a factorial replicated 6 times with 3 levels of phosphate (50, 100, 200 pounds) and 4 levels of potash (0, 20, 40, 80 pounds per acre), was designed to determine the optimum ratio of phosphate to potash at a fixed level of nitrogen for a representative Matanuska Valley soil (Bodenburg loamy silt). Each phosphate increase gave a highly significant yield increase and significantly decreased the percentage of water in the foliage. Potash increments could not be related to yields or moisture content.

Effect of phosphate and potash on lettuce

Treatment Pounds per acre	Green weight	Dry weight	% water
Phosphate, average of 24 pots, in grams			
50	12.46	0.78	94.15
100	21.13	1.88	91.12
200	25.95	2.51	90.25
Potash, average of 18 pots, in grams			
0	18.94	1.69	91.63
20	20.75	1.84	91.68
40	19.63	1.70	91.78
80	20.09	1.66	92.28

Source	DF	Green weight SS	Green weight MS	Dry weight SS	Dry weight MS	% water SS	% water MS
Total	71	3506		49.4		334	
Treatments	11	2348	213**	36.2	3.5**	213	19**
P_2O_5	2	2238	1119**	36.8	18.4**	201	101**
K_2O	3	32	10	0.4	0.1	5	2
$P_2O_5 \times K_2O$	6	78	13	1.0	0.2	7	1
Replications	5	234	47	2.0	0.4	16	3
Error	55	924	17	9.2	0.2	105	2
Least significant difference							
At 5% level		2.38		0.24		0.80	
At 1% level		3.17		0.32		1.07	

The second of these experiments was a 2^3 factorial replicated 8 times involving 3 minor elements. These were manganese, iron, and boron applied at the rates of 200, 100, and 25 pounds per acre respectively super-imposed on a uniform, arbitrary treatment including nitrogen, phosphate and potash. It was found that no minor elements or combination of minor elements increased the fertility of Bodenburg loamy silt as measured by the response of lettuce.

Effect of 3 minor elements on lettuce grown in the greenhouse

Treatment		Green weight	Dry weight	% water
	Average of eight pots, in grams			
1	None	8.8	0.7	92.3
2	Manganese	8.3	0.6	93.3
3	Iron	8.6	0.6	92.7
4	Boron	8.0	0.6	92.7
5	Manganese and iron	8.9	0.6	92.6
6	Manganese and boron	8.6	0.6	92.3
7	Iron and boron	8.4	0.6	92.3
8	Manganese, iron and boron	5.3	0.4	92.0

Source	DF	Green weight		Dry weight		% water	
		SS	MS	SS	MS	SS	MS
Total	63	539		3.3		199	
Treatments	7	78	11	0.5	0.07	9	1
Replications	7	87	12	0.6	0.08	57	8
Error	49	373	8	2.2	0.04	133	3

11. PUBLICATIONS: None

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-2

2. Division: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Horticultural Crop Investigations

5. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

6. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

7. LOCATION(S): Matanuska and Fairbanks Experiment Stations

8. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (participated in lettuce variety tests and small fruits test); Cheyenne Horticultural Field Station and United States Forest Service (participated in testing of ornamentals); Soils Science Department (participated in potato fertilization studies) Agricultural Engineering (participated in vegetable storage and vegetable forcing).

9. OBJECTIVE OF CURRENT WORK: (1) Potato breeding for an earlier maturing, higher yielding, disease resistant variety for Alaska. (2) Potato fertilization studies to determine proper fertilization practices for maximum yields and highest quality. (3) Winter forcing of vegetables to increase scanty supplies of vegetables. (4) Testing of ornamentals for adaptability and hardiness. (5) Tree and small fruit testing for hardiness. (6) Greenhouse culture of vegetable crops and ornamentals to determine most suitable varieties and cultural practices. (7) Vegetable variety testing to secure better adapted varieties and crops.

10. PROGRESS DURING THE YEAR: (1) AL-1-2-4(R) Tests of potato varieties and Alaska Experiment Station selections indicate that some are superior to varieties now commonly grown in Alaska. Plans made for on-farm tests of these. Selection work continued among progeny of 49 crosses made in 1947. (2) AL-1-2-7(P) In the Tanana Valley, a field study on Fairbanks silt loam again compared 5 levels each of nitrogen, phosphate, and potash in 121 combinations for fertilizing Arctic Seedling potatoes. Superior quality and good yields were produced by a fertilizer containing 30 to 50, 120, and 60 pounds per acre, respectively, of the above nutrients. In the Matanuska Valley, 4 other varieties were grown at various levels of nitrogen and potash in an attempt to improve cooking quality. (3) AL-1-2-8(T) No systematic work has yet been attempted on this project because of lack of storage facilities, equipment and trained personnel.

(4) AL-1-2-9(F) Additional forcing stocks of rhubarb were collected and stocks on hand were propagated. (5) AL-1-2-10(F) Thirty-five species of trees and 46 of shrubs were secured as nursery stock and set last summer. In addition 45 species of trees and 70 species of shrubs were secured as seed and planted in specially constructed propagation beds. A test of annual flowers consisted of 19 species and 94 varieties. (6) AL-1-2-11(F) Tree fruit variety tests were increased by 35 varieties of apples, 7 apricots, 10 cherries, and 7 plums. (7) AL-1-2-12(F) Test plantings at the Matanuska Station last year were increased by 32 varieties of strawberries, 24 raspberries, 9 currants, and 8 gooseberries. Older plantings were propagated to increase stocks for future breeding work. (8) AL-1-2-13(F) An investigation was made of the effects of adding varying proportions of sand and/or soil conditioners (peat, manure, muck, and vermiculite) to greenhouse soils to improve their structure, increase seed germination and seedling growth. By use of a split-plot design the effect of using commercial fertilizers was also measured. The results of this investigation will be published at an early date. (9) AL-1-2-14(F) A lattice-type test of 15 varieties of lettuce and 15 U. S. D. A. selections indicated that U. S. D. A. Selection 3310 is better adapted for culture in the Matanuska Valley than any of the present day commercial varieties tested.

11. TELL BRIEFLY 1 or MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Four Alaska Experiment Station potato selections have been developed to the point where they are ready for on-farm tests by commercial growers. These varieties equal, or exceed, the varieties now commonly grown in yields and are far superior to them in such characteristics as size and shape of tubers, shallowness of eyes, and freedom from skin feathering. Growers in both the Tanana and Matanuska Valleys have benefited by Station tests resulting in the introduction of superior varieties of lettuce, tomatoes and cucumbers.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Chief emphasis will be laid on potato breeding (AL-1-2-4(R); potato culture and storage investigations (AL-1-2-7(P); vegetable forcing investigations (AL-1-2-9(F); tree fruit variety testing and culture (AL-1-2-11(F); small fruit variety testing, breeding and culture (AL-1-2-12(F); and vegetable variety testing and breeding (AL-1-2-14(F).

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-4(R)

2. PROJECT TITLE: (Rev.) Potato Breeding

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: None

7. OBJECTIVE OF WORK: To produce 1 or more potato varieties adapted to the major potato producing sections of Alaska which will possess superior yielding ability, increased earliness of maturity, better qualities for cooking and processing, better tuber and vine characteristics, and which will be resistant to the major diseases affecting potatoes in the Territory.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Major emphasis during the coming year will be given to the following lines of work: (1) Increasing present stocks of the most promising of the Station selections with the objective of introducing them to potato growers in 1952. (2) Variety and strain tests. (3) Further study and selection among the newly developed Station seedlings. (4) Material is now on hand for crossing to increase resistance to scab, rhizoctonia and ring rot.

9. TELL BRIEFLY 1 or MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Four of the station selections have been developed to the point where they can be made available to potato growers in the Territory for field trials during the coming season. These selections equal or exceed in yield any of the varieties now being grown and are far superior to them in smoothness, size and shape of tubers, freedom from skin feathering and, in some cases, in earliness of maturity.

10. PROGRESS DURING THE YEAR: In a lattice test of 81 varieties, Station selections and selections sent to Alaska for testing by the U. S. D. A., yields ranged from 483 bushels (14.49 tons) per acre for 1 of the Alaska selections (57.44-3-46) to 194 bushels (5.82 tons) for 1 of the U. S. D. A. selections (B-91-14). Among the 10 highest-yielding varieties 4 were

Alaska Station selections (Nos. 57.44-3-46, 55.44-3-46, 55.44-1-46, and 44.41-2-43), 1 was a U. S. D. A. selection (No. 47258), and 5 were commercial varieties (Sequoia, Ashworth, Kennebec, Arctic Seedling, and Ontario). Data were also secured on such characteristics as number, distribution and depth of eyes, amount of scab, skin feathering, presence and degree of cracking, general appearance and specific gravity.

An identical test was also conducted at the Fairbanks Station during the past summer. However, extreme drought conditions in the Tanana Valley caused a very uneven stand of plants and so no reliable data were obtained.

In addition to the variety tests, approximately 1,000 selections were grown at the Matanuska Station for increase, study, and further selection.

11. PUBLICATIONS: It is planned to publish the results of the 1948, 1949, and 1950 potato variety tests at the first opportunity.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-7 (P)

2. PROJECT TITLE: Potato Culture and Storage Investigation

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: Allan H. Mick, Myron F. Babb

5. LOCATION: Fairbanks Experiment Station

6. COOPERATION: Horticulture Department, local commercial processor (Anchorage Potato Chip Company)

7. OBJECTIVE OF WORK: To investigate the influence of various rates of nitrogen, phosphate, and potash on potato yields and quality; to determine the effect fo storage methods on potato quality.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Study will be continued to confirm results of fertilizer tests and storage investigations.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Potatoes are an important cash and garden crop in Alaska. Alaskan growers, however, encounter many obstacles in producing and marketing their potatoes. Yields are generally low, averaging about 4 tons per acre of marketable tubers. Cooking quality is poor in the light of generally favorable environmental conditions. Alaskan farmers must compete for local markets with subsidized growers who ship in high quality produce from the northwestern states. Quality and yields depend in a large measure upon favorable soil nutrition and storage practices. Any information along these lines will result in benefits to Alaskan agriculture.

10. PROGRESS DURING THE YEAR: Under the conditions prevailing in the Tanana Valley this season, a comparison of 121 combinations of 5 levels each of N, P_2O_5 and K_2O shows that; (1) one of the best combinations for Arctic Seedling potatoes grown on Faribanks silt loam contains, in pounds per acre:

30-50 pounds of nitrogen
120 pounds of phosphoric acid
30-60 pounds of potash

(2) In this dry season, yields of U. S. Number 1 tubers were proportional to the amount of nitrogen applied up to and including 50 pounds per acre. (3) Of the 3 nutrients, potash appears most closely related to specific gravity. Large amounts of potash decrease specific gravity values. (4) Heavy applications of 1 or 2 nutrients in the absence of the other depressed yields as compared to no treatment. In other words a balanced fertilizer is most efficient. (5) Extremely low quality was associated with low nitrogen and with or without high potash.

In the Matanuska Valley 4 varieties were treated with various combinations of nitrogen and potash at a constant level of phosphate. Samples were saved for cooking tests. The results of this study have not yet been statistically analyzed.

11. PUBLICATIONS: Available results were considered in compiling information for Circular 13 dealing with fertilizer recommendations.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-8(T)

2. PROJECT TITLE: Vegetable Culture, Storage and Processing Investigations

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Agricultural Engineering

7. OBJECTIVE OF WORK: Cultural investigations on the more important vegetable crops to increase earliness of maturity and/or total yields. Storage and processing investigations to determine proper methods of storage and/or processing of the crops and varieties of vegetables of economic importance in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Chemical control of weeds in vegetable crops of major economic importance in Alaska in an effort to reduce production costs and increase yields.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: No systematic work has yet been attempted on this project because of lack of experimental storage facilities, equipment, and sufficient trained personnel to carry on the more technical phases of the work.

10. PROGRESS DURING THE YEAR: Small scale or "pilot" tests were conducted last summer on the chemical control of weeds to determine the nature of some of the problems and equipment needs.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-9(F)

2. PROJECT TITLE: Vegetable Forcing Investigations

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. I. Branton

5. LOCATION(S): Matanuska Experiment Station

6. COOPERATION: Agricultural Engineering

7. OBJECTIVE OF WORK: To determine the most suitable varieties and methods for the winter forcing of such crops as rhubarb, asparagus, witloof, etc., and to investigate the possibilities of building suitable forcing structures wholly from native materials or of using existing greenhouse structures for the purpose.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Until the necessary forcing structures can be constructed, work on this line project must of necessity be limited to the collection and increase of stocks of forcing materials.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Very little work has been done on this line project as yet. See items 8 and 10 of this report.

10. PROGRESS DURING THE YEAR: Additional stocks of rhubarb were purchased and set in the field at the Matanuska Station during the past summer and stocks already on hand were lifted and divided to increase the number of plants.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-10(F)

2. PROJECT TITLE: Variety Testing and Culture of Ornamentals

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: None

7. OBJECTIVE OF WORK: To determine the hardiest and most suitable types of ornamental plants for Alaskan conditions and to develop methods for their culture.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Except for the maintenance and propagation of ornamental stocks already on hand, it is proposed to hold work on this line project to a minimum for the duration of the present emergency.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Since the initiation of this work an ever increasing number of people are consulting Station personnel concerning their landscaping problems, and assistance has been given on such projects as landscaping the Kodiak Island Naval Base and the Mt. Edgecomb Hospital in Southeastern Alaska as well as on several lesser projects.

10. PROGRESS DURING THE YEAR: During the past year 35 species of trees and 46 species or varieties of shrubs were planted at the Matanuska Station. These were set 5 feet apart in rows spaced 10 feet apart. Those surviving the initial test will be balled out and set into permanent locations. See appended sheet for list of trees and shrubs planted. Since nursery stock is always injured more or less in shipment and sometimes also shows evidence of having been injured in the nursery, it is questionable whether hardiness tests based on the use of nursery stock actually test the inherent hardiness of a given species or merely tests its relative freedom from previous injury.

Partially to overcome this difficulty and to secure a greater variety of materials for testing, 45 species of trees and 70 species of shrubs were propagated by seed in nursery beds located on the grounds of the Alaska Agricultural Experiment Station. Certain species require spring seeding and good stands were secured with these in practically all cases. The remainder were fall seeded, so it is not yet known what measure of success will be realized in securing a stand.

A planting of annual flowers consisting of 94 varieties, representing 19 species was made at the Matanuska Station during 1950. Twelve varieties of Chrysanthemums were also set out, but the plants arrived in very poor condition and only a few of them survived. Notes and pertinent data were taken on their relative merits for culture in Alaska.

A considerable number of both native and introduced ornamentals was assembled at the Fairbanks Station during the past year, but no reports can yet be made as to their survival or value for Alaskan conditions.

11. PUBLICATIONS: None

Trees and Shrubs Planted as Nursery Stock, 1950

Trees, Shrub-Trees

Acer ginnala, A. negundo, A. saccharinum
Amelancher sp.
Betula pendula
Celtis occidentalis
Fraxinus lanceolata
Gleditsia triacanthos inermis
Malus sp. (4)
Pinus sp.
Populus alba, Populus sp.
Prunus amygdalus, P. japonica, P. padus, P. triloba, Prunus sp.
Pyrus baccata
Quercus macrocarpa
Salix alba, S. babylonica, S. pentandra, S. vitellina
Sambucus aurea, S. laciniata, S. racemosa
Shepherdia argentea
Sorbus americana
Tamarix sp.
Ulmus americana, U. americana x siberica, U. pumila

Shrubs

Caragana arborescens, C. pygmea
Cornus aurea, C. baileyi
Cotoneaster acutifolia, C. integerrima
Forsythia suspensa
Lonicera tartarica, Lonicera sp.
Philadelphus coronarius
Rhamnus cathartica
Rhus aromatica, R. Glabra
Rosa sp. (11)
Spirea froebelli, S. opulifloria, S. vanhouttei
Symphoricarpus orbiculatus
Syringa sp. (16)
Viburnum lantana, V. tomentosum

Trees and Shrubs Planted as Seed, 1950

Trees, Shrub-Trees

Acer ginnala, A. glabrum, A. negundo, A. rubrum, A. saccharinum (dasycarpum)
Ailanthus altissima
Celtis occidentalis
Eleagnus angustifolia, E. commutata
Euonymous europaeus
Fraxinus lanceolata
Gleditsia triacanthos inermis
Hippophae rhamnoides
Juglans cinerea
Larix decidua
Malus zumi
Phellodendron amurense
Picea abies, P. glauca densata
Pinus aristata, P. cembra, P. flexilis, P. mugo mughus, P. nigra, P. ponderosa, P. thunbergii
Prunus americana, P. amygdalus, P. melanocarpa, P. virginiana
Ptelea angustifolia, P. orophylla
Quercus macrocarpa
Rhamnus davurica
Robinia neo-mexicana, R. pseudoacacia
Sambucus nigra, Sambucus sp.
Shepherdia argentea
Sorbus americana, S. aria
Thuja occidentalis, T. plicata
Tilia americana
Ulmus americana

Shrubs

Amorpha fragrans, A. fruticosa
Aronia prunifolia
Atraphaxis busifolia
Buddleia alternifolia, B. davidi, B. lindleyana
Calluna vulgaris
Caragana arborescens, C. microphylla, C. pygmaea
Ceanothus americanus
Colutea arborescens
Cornus stolonifera coloradensis
Cotoneaster acutifolia, C. lucida, C. melanocarpa laxiflora, C. racemiflora soongorica
Crataegus ambigua, C. rivularis
Deutzia scabra
Forestiera neo-mexicana
Halimodendron halodendron

Shrubs (Continued)

Juniperus communis depressa, J. communis saxatilis, J. scopulorum
Kalmia angustifolia
Ligustrum vulgare
Lonicera alpina, L. bella alpida, L. bella candida, L. bella rosea, L. billardi, L. gibbiflora, L. gibbosa, L. nervosa, L. permixta, L. tartarica lutea, L. tartarica sibirica, L. virginalis alba, L. xylosteoides, Lonicera sp.
Maclura pomifera
Philadelphus coronarius
Physocarpus intermedius, P. monogynus, P. opulifolius
Prunus besseyi, P.nana, P. tomentosa, Prunus sp.
Rhamnus cathartica, R. chlorophora, R. erythrocarpa, R. frangula, R. oleoides, R. saxatilis, R. tinctoria
Rhus aromatica, R. copallina, R. glabra cismontana
Ribes aureum
Rosa maximowicziana, R. rubrifolia
Sorbaria stellipila
Symphoricarpos albus (racemosus), S. occidentalis, S. orbiculatus (vulgaris)
Viburnum lantana, V. lentago

ANNUAL FLOWER PLANTINGS
1950

Variety	No. of Species
Asters	2
Calendula	4
Candytuft	2
Chinese Forget-Me-Not	4
Cosmos	4
Dianthus	5
Gladiolus	16
Gypsophila	4
Larkspur	3
Linaria	1
Lobelia	1
Marigold	12
Petunia	8
Phlox	1
Salpiglossis	3
Scabiosa	2
Snapdragon	16
Stocks	2
Zinnias	4

Chrysanthemums

Arikara	6
Dakota Mum	6
Flicka	6
Manantico	6
Moonglow	6
Oglalla	6
Pink Cushion	6
Red Wing	6
Teton	6
Waku	6
Winooski	7
Wyoming White	6

ALASKA AGRICULTURAL EXPERIMENT STATION
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Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-11(F)

2. PROJECT TITLE: Tree Fruit Variety Testing and Culture

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: None

7. OBJECTIVE OF WORK: Variety tests coupled with cultural investigations to determine the potential hardiness of tree fruit varieties and the possibility of fruit production in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: An attempt will be made to find additional promising varieties to add to the collection at the Matanuska Station and a limited variety test of hardy stocks will be initiated at the Fairbanks Station.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: In work of this kind it is difficult, or impossible, to evaluate results until after the lapse of several years. However, there is perhaps as much interest in this project on the part of the public as in any of the horticultural projects and a start has been made toward determining if tree fruit production is possible in Alaska.

10. PROGRESS DURING THE YEAR: Tree fruit plantings at the Matanuska Station during the past year included 5 trees each of 35 varieties of apples, 7 varieties of apricots, 10 varieties of cherries, and 7 varieties of plums. A September inventory of last years plantings showed that the Kahinta and Waneta plums, the Manchurian apricots and all but one bush of the Hansen Super Bush cherry were dead. Some killing was also found in a majority of all types of tree fruits, but surviving trees made from fair to good growth during the past summer. It should be noted, however, that winter injury was common even among the surviving trees and it is to be expected that many of them will succumb during the winter.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-12(F)

2. PROJECT TITLE: Small Fruit Variety Testing, Breeding and Culture

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: None

7. OBJECTIVE OF WORK: Variety tests to determine the hardiness and suitability of such small fruits as strawberries, raspberries, blueberries, currants, gooseberries, Nanking cherries (Prunus tomentosa, sand cherries, sand cherry x Prunus tomentosa hybrids), etc., for culture in Alaska or for use as parental lines in crosses designed to create hardy varieties. Investigations of cultural methods and fertilization of small fruits as influencing their hardiness and the possibilities of their culture in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Search will be resumed for hardy varieties of bush fruits to add to the Matanuska Station collection and to initiate tests at the Fairbanks Station. Stocks on hand will be propagated as much as possible to obtain sufficient material for yield tests and cultural studies. It is not planned to import more strawberry stocks, however, until virus-free stocks can be obtained from the States.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: A collection has been made of all available hardy stocks of strawberries of which, there is reason to believe, the greater part are the so-called "Sitka Hybrids." These will be used in future breeding programs here and have already been shared with State-side strawberry breeders.

10. PROGRESS DURING THE YEAR: Test plantings of small fruits at the Matanuska Station during the past year included 32 varieties of strawberries, 24 varieties of raspberries, 9 varieties of currants, and 8 varieties of gooseberries. There was considerable killing in practically all types of small fruits during the past winter, but surviving plants made unusually good growth during the summer. At the Fairbanks Station a planting of 368 blueberry selections was renovated last summer and present indications are that it contains much valuable material. This planting was made by Dr. J. P. Anderson in 1931 and consists of selections from native plants throughout the Territory.

11. PUBLICATIONS: None

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-13(F)

2. PROJECT TITLE: Vegetable and Flower Production in Greenhouses

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: None

7. OBJECTIVE OF WORK: To determine the most suitable crops and varieties for greenhouse culture in Alaska and the influence of such factors as fertilization, watering practices, time and methods of planting, light duration and intensity on production. Secondarily, it is considered important to investigate the possibility of winter crop production in greenhouses and the possibilities of using such structures for the winter forcing of such crops as rhubarb, asparagus, etc., to supplement the rather scanty supply of fresh winter vegetables.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Present greenhouse facilities will be taxed to their utmost next summer for propagation purposes, thus affording no opportunity for other types of work. A new greenhouse range which is in the process of construction probably will not be completed before next fall. For these reasons it appears likely that little work can be done on this line project during the coming year.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THE WORK: Very little work has been or can be done on this line project until the completion of the new greenhouse range. However, small-scale tests of tomatoes and cucumbers made last year were so definitive in nature that many growers are known to have adopted the newer, better varieties of both crops for growing in their own greenhouses.

10. PROGRESS DURING THE YEAR: Soils in the Matanuska Valley are not well adapted for greenhouse use because their fine texture and general lack of structure causes them to pack badly when used in seed flats or greenhouse benches. Under such conditions seed germinates poorly and the

growth of young seedlings is seriously stunted. During the past season an experiment was conducted to determine if the soil can be improved by the addition of varying proportions of sand and/or such soil conditioners as peat, manure, muck or vermiculite. One-half of each flat was fertilized with a 4-12-4 mixture at the rate of 500 pounds to the acre. Twelve soil combinations with 3 replications of each were well randomized in a split-plot design. Seeds of cauliflower and celery were sown for the test crops.

The results of this study indicate that: (1) Emergence of both celery and cauliflower was poorest on soil alone. (2) A soil mixture containing 20, 30 or 50 percent sand gave the most satisfactory emergence with both crops. (3) The use of commercial fertilizer did not affect the emergence of either crop. (4) Seedling growth was most satisfactory for both crops on soil containing 40 percent sand plus 20 percent of any one of the 4 soil conditioners.

11. PUBLICATIONS: The results of this test will soon be published.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-2-14(F)

2. PROJECT TITLE: Vegetable Variety Testing and Breeding

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER(S): M. F. Babb, C. H. Dearborn, Arvo Kallio

5. LOCATION(S): Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Division of Fruit and Vegetable Crops and Diseases

7. OBJECTIVE OF WORK: Variety testing in an attempt to find vegetable varieties and even crops best adapted to culture in Alaska or that have characteristics making them valuable as parental material in a breeding program designed to produce adapted varieties.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Systematic variety tests will be conducted with lettuce, cabbage and possibly with celery to determine which varieties are best adapted for culture in the Matanuska and Tanana Valleys.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: A pilot test in 1949, followed by a systematic test this year indicate that at least 1 U. S. D. A. strain of lettuce (No. 3310) is better adapted for culture in the Matanuska Valley than any of the present commercial varieties. One grower thinks so highly of it that he has made private arrangements with a seedhouse in the States for the growing of seed and the possibility of naming and introducing this strain is under consideration.

10. PROGRESS DURING THE YEAR: A lattice-type test of 25 varieties and strains of lettuce was conducted at the Matanuska Station during the past summer. Fifteen of these were commercial varieties and included practically all of the well known varieties now being grown in the States as well as 4 of the Great Lakes strains, Pennlake, and Progress. Ten of them were U. S. D. A. strains sent to Alaska for testing by the Division of Fruit and Vegetable Crops and Diseases.

The data have not yet been fully analyzed, but it is evident that there were great differences among varieties in such characteristics as size and shape of head, degree and location of tipburn, density, and number of marketable heads produced. Some of the varieties, such as Progress, which are said to be well adapted to certain regions in the States, appear to be worthless under Alaskan conditions. On the other hand, U. S. D. A. strain Nos. 3310, 3867, and 2451 which have not been found especially well adapted to culture in the States seem to be well adapted here. At least 2 more year's work will be required to prove or disprove these observations.

11. PUBLICATIONS: None, though possibly a progress report may be issued later this year after the data are fully analyzed.

UNITED STATES DEPARTMENT OF AGRICULTURE

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-3

2. DIVISION: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Animal and Dairy Production

5. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

6. SUPERVISORY LEADER: William J. Sweetman

7. LOCATION: Alaska Agricultural Experiment Station, Palmer, Fairbanks, and Petersburg, Alaska

8. COOPERATION: Bureau of Dairy Industry (furnished bulls); Bureau of Animal Industry (cooperated in breeding and feeding of fur animals); Agricultural Engineering (participated in forage drying); Agronomy Department (participated in forage); Matanuska Valley Breeder's Association (cooperated in the artificial breeding program).

9. OBJECTIVE OF CURRENT WORK: A stable dairy industry is needed in Alaska and this depends to considerable extent on the development and maintenance of cows possessing the ability to produce large amounts of milk. A breeding research program is needed to develop superior germ plasm and this germ plasm should be made available through artificial insemination to the farmers in the Territory. Improved methods of raising dairy calves are needed to raise all dairy replacements in the Territory rather than shipping them in. Better methods of harvesting and storing are needed to preserve the forages fed to all animals. For the development of an Alaskan fur industry experimental work is necessary in the breeding and feeding of mink, marten, blue, white, and silver foxes.

10. PROGRESS DURING THE YEAR: Raising Dairy Calves (AL-1-3-1(H): Several rations have been developed that will raise calves in Alaska at less cost than the animals are worth for beef at 6 months of age. Nine calves raised on calf meal had an average daily gain of 1.27 pounds and cost $56.95 per calf to 6 months of age. Ten calves raised on calf manna had a daily gain of 1.39 pounds and cost $61.35 per calf. Eight calves raised on skim milk powder had a daily gain of 1.38 pounds and cost $44.34 per calf.

The Value of Light for Increasing Milk Production During the Alaska Winter Season (AL-1-3-2(R): The trend seems to be more heat periods and better conception with extra light, but very little difference in milk production. When cows go into the winter with a gradual shortening of days, there seems to be very little difference in production or

rate of decline. If cows are abruptly changed in the middle of the winter, the cows going from light to dark fall off in production much faster than cows changed to extra light.

Dairy Cattle Breeding Investigations (AL-1-3-3(R): This year (1950) 559 cows were bred artificially to the 4 bulls. Some of the first heifers born will be calving starting in May of 1951. There is a very great demand for heifers. Very few farmers will sell any of these heifers. We now have production records on a large percentage of the dams of these heifers. From December 1948 to September 1950 (22 months) 885 cows were bred for the first service. The numbers of 1st, 2nd, 3rd, 4th and 5th services in this period were 885, 439, 216, 106, and 52. The percentages of non-returns for each service were 51.9, 53.5, 55.1, 50.0, and 28.8, respectively. The percentage of non-returns for all services was 51.9. June has been the poorest month of the year for 3 years. The Station herd now has 5 Dane-Guernsey and 3 Holstein-Guernsey crossbred heifers. The first crossbred heifer is due to calve in May 1951. Three cows in the herd now have both crossbred and pure bred heifers.

Sea Fish and Sea Mammals and Their Products as Food for Fur Animals AL-1-3-6(T): Four feeding experiments were carried on during 1950, 2 with mink and 2 with blue foxes. For female mink during their breeding, gestation, and suckling period, a ration containing 80% salmon waste was found superior to 3 other rations from production, health, and economic standpoints. During the mink growing and furring out period, an 82% salmon waste-without-heads ration was found superior to 3 other rations from the standpoints of health and the low number of poor skins. The 30% salmon waste and 30% red snapper ration fed to female foxes during their breeding, gestation, and suckling periods was more satisfactory than the 60% flounder ration from a production standpoint and on the basis of average gains in weight. Although no conclusions regarding fur quality can be made at this time, from health and economic standpoints it appears that a ration containing 55% salmon waste and 10% seal meal was superior to a 45% halibut head and 10% seal meal ration for foxes during their growth and furring out period.

Cross Breeding of Various Fur Animals for Hybrid Vigor, Mutation Fixation, and Fur Quality (AL-1-3-7(T): A breeding program was started to determine the dominance and color characteristics of the Arctic white, blue, and mutation blue fox. Two pairs of wild-caught tundra mink were obtained this past summer for breeding purposes. Nine female marten were bred during the summer of 1950; 5 of them were 3 to 4 years of age but had never been bred before.

The Effect of Different Levels of Manganese in the Diet of Hens and Pullets (AL-1-3-9(F): There were no indications that local grown grains do not have enough manganese for hens and pullets. It may be that they would have to be on local grown grains for over one year for this to show up. One year's production does not show any difference.

Pasture and Range Improvement and Management (AL-1-6-6(F): Even though we do not have a legume that will live over winter in pastures, renovation increases the yield of standard cow days. Average yields in terms of standard cow days per acre were: (1) check pastures, 45.8; (2) year of renovation, 51.2; (3) year after renovation, 62.8; (4) second year after renovation, 70.5.

Feed Procuction, Processing and Preservation (AL-1-6-7(P): Silage is definitely the best and cheapest way to preserve forage in Alaska. It also takes less acreage to feed a cow all winter on silage than either barn dried or field cured hay. The milk production per acre from second cutting bromegrass was 1995 pounds on silage, 1850 pounds on barn dried hay and 1676 on field cured hay. Stack silage proved to be a good way to store surplus forage.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Artificial insemination is definitely successful in Alaska and reduces the number of bulls necessary. The roughage these extra bulls would eat will keep a number of cows. Heifers can be raised much cheaper than replacements can be shipped in from the States. The use of silage reduces the acreage requirements necessary to feed a herd for the winter. Red snapper (red cod) is inferior to salmon, salmon cannery waste, flounders, and gray cod in the ration of ranch mink from a reproduction and health standpoint. Contrary to last year's report, standard silver foxes will breed and reproduce on rations containing high percentages of Alaska fish products. The high mortality usually experienced among fox pups from 1 to 3 months of age, whose dams have received 50% or more halibut heads in their rations, can be averted by substituting 10% horse meat and 40% red snapper for the halibut heads when the pups are from 3 to 4 weeks of age.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Now that we have a new and bigger fan in the barn drier we will continue to see if it is possible to make barn dried hay that will approach silage in feeding value and efficiency (AL-1-6-7(P). We will continue to put as many heifers on the extra light as possible to determine if extra light does influence the number of heat periods (AL-1-3-2(R). Experimentation (1) with aureomycin (A.P.F-5) will seek to gain perliminary information on the use of this product to promote growth and health of young mink and its effect on the "yellow fat" disease of mink; and (2) with one or more antibiotics will investigate the possibility that the "yellow fat" disease may be caused by a vitamin "E" avitaminosis (AL-1-3-6(T).

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-1(H)

2. PROJECT TITLE: Raising Dairy Calves

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: William J. Sweetman, Wallace Middleton and Fred Swingle

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Alaska Experiment Station and Agricultural Research Administration

7. OBJECTIVE OF WORK: To develop efficient rations and methods of raising dairy calves in Alaska; compare several rations for growing calves as measured by weight gains, health and efficiency of feed utilization.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Due to the fact that shipping may not be too dependable from Seattle to Alaska because of the shortage of shipping space it may become necessary to depend more on Alaskan products for livestock feed. Calf rations using more Alaskan products will be developed to raise calves.

9. TELL BRIEFLY 2 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Several rations have been developed that will raise calves in Alaska, and at a much cheaper price than it would cost to ship in replacements.

10. PROGRESS DURING THE YEAR: Nine calves were raised on calf meal. The average daily gain was 1.27 pounds per day and the cost to 6 months of age was $56.95 per calf. Ten calves were raised on calf manna. The average daily gain was 1.39 pounds and the cost to 6 months of age was $61.35 per calf. Eight calves were raised on skim milk powder. The average daily gain was 1.38 pounds and the cost to 6 months of age was $44.34 per calf. All the rations proved very satisfactory but the skim milk powder was the cheapest. The main reason for skim milk being cheaper is because calves can be changed directly from colostrum milk to skim milk without feeding any saleable milk. The cost of raising calves in Alaska is in direct proportion to the amount of whole milk that has to be fed to the young calf.

11. PUBLICATIONS: One is being written.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-2(F)

2. PROJECT TITLE: The Value of Light for Increasing Milk Production

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: William J. Sweetman, Wallace Middleton and Fred Swingle

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Alaska Experiment Station and Agricultural Research Administration

7. OBJECTIVE OF WORK: To determine if lengthening the period of light to which Alaskan cows are exposed during winter favorably affects milk production and increases conception rate.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: As many heifers as possible will be put on this experiment next winter to determine if extra light has any effect on heat periods.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: The trend seems to be for more heat periods and better conception with extra light but very little differences in milk production.

10. PROGRESS DURING THE YEAR: When cows go into the winter with a gradual shortening of days, there seems to be very little difference in production or rate of decline. In the middle of the winter when days are very short and the cows are changed abruptly, the cows going from light to dark seem to fall off in production much faster than the cows changed to extra light. Three cows changed from dark to light gave 513 pounds of fat corrected milk the first 10 days and 528 pounds the second 10 days after the change. They gave 412 pounds the last 10 days of a 60 day period. Three similar cows changed from light to dark for the same periods gave 516 pounds the first 10 days, 482 pounds the second 10 days and 384 pounds the last 10 days. The percent of decline for the light cows for 60 days was 19.6% and the dark cows was 25.5%.

The totals for 6 cows in light were 1234 pounds of fat corrected milk the first 10 days and 962 pounds the last 10 days of a 60 day period.

The totals for 6 cows in the dark were 1235 pounds and 923 pounds. The total production while in the light was 6590 pounds of fat corrected milk and 6316 while in the dark.

11. PUBLICATIONS: Paper presented at the annual meeting of the American Dairy Science Association, Ithaca, N. Y., June 22, 1950.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-3(R)

2. PROJECT TITLE: Dairy Cattle Breeding Investigations

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: William J. Sweetman and Wallace Middleton

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Bureau of Dairy Industry

7. OBJECTIVE OF WORK: In order to improve the producing ability of Alaskan dairy cattle a breeding research program is needed to develop superior germ plasm and this germ plasm should be made available to the farmers of Alaska through artificial insemination.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Considerable emphasis will be placed on shipping semen to various parts of Alaska. A number of shipments were made to Fairbanks this past year and four cows at the Experiment Station at Fairbanks were successfully inseminated from the bulls at Matanuska.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Three-hundred-sixty cows were bred artificially the first year (May 1948 to April 1949). Five-hundred-nine cows were bred the second year. Three-hundred-ninety-five cows have been bred from May to December of 1950. The first heifers born from these bulls will start calving in April 1951.

10. PROGRESS DURING THE YEAR: From December 1948 to September 1950, 885 cows were bred. During this period there were 885 first services, 439 second services, 216 third services, 106 fourth services and 52 fifth services. There were a total of 1698 services and 882 non-returns. The percent of non-returns was 51.9% on all services. an average of 1.91 services per cow.

We now have 5 Dane-Guernsey and 2 Holstein-Guernsey crossbred heifers. The first crossbred heifer is due to calve in May 1951. There are 3 cows that have both crossbred and pure bred heifers. Nine cows and heifers will have crossbred calves this year.

At least 1 of the pure bred Dane heifers shipped from Beltsville this year is with calf to a Dane bull in Michigan. The semen made very good time in coming from Michigan. Two shipments arrived in 26 hours and the other in 50 hours. The 26-hour shipments were in very good shape.

11. PUBLICATIONS: None.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-5(F)

2. PROJECT TITLE: The Effect of the Addition of Artificial Light on Egg Production and Physical Conditions of Laying Hens

3. PERIOD COVERED BY THE REPORT: January 1 to June 30, 1950

4. SUPERVISORY LEADERS: William J. Sweetman and Fred L. Swingle

5. LOCATION: Fairbanks Experiment Station

6. COOPERATION: Alaska Experiment Station and Agricultural Research Administration

7. OBJECTIVE OF WORK: To determine the number of hours of light that poultry flocks should have for best production in the winter under Alaskan conditions.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This project has been discontinued.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Chickens in Alaska need at least 12 hours of light per day.

10. PROGRESS DURING THE YEAR: Pullets used the first year having 12 and 14 hours of light produced significantly more eggs than those receiving only 10 hours of light. There were no significant differences in production between 12 and 14 hours. The hens receiving 14 hours of light did not produce as many eggs as those receiving 12 hours of light. These same hens randomized into 3 groups for the second year's production did not show any difference in production between any of the 3 lengths of light.

11. PUBLICATIONS: None.

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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-6(T)

2. PROJECT TITLE: Feeding of Fur Animals

3. PERIOD COVERED BY REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER: James R. Leekley

5. LOCATION: Experimental Fur Station, Petersburg, Alaska

6. COOPERATION: Fishery Products Laboratory, Ketchikan, Alaska (collected the salmon waste used, and made chemical analysis of rations fed).

7. OBJECTIVE OF WORK: To carry on feeding experiments with mink, marten, blue, white, and silver foxes and their various mutations to determine the value of raw, fresh, and processed fish, fish waste, by-products of fish canneries and cold storages, and such sea mammals and their by-products as are available in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Mink Experiment No. 20, starting January 30 and terminating about July 1, will further study the use of raw salmon waste-without-heads, raw salmon waste, cooked salmon waste, and compare rations containing high percentages of these ingredients with a ration high in raw flounders, during the breeding, gestation, and suckling periods. The ration fed half the mink on each experimental ration will be supplemented with non-purified aureomycin (A.P.F-5) to gain preliminary information on the use of this product to promote growth and health of young mink, and its effect on the "yellow fat" disease of mink. Feeding experiments starting in July or early August, designed to continue our investigation of various salmon and halibut waste products, will be carried on with adult and young foxes and mink during their growing and furring out period. If animals and funds are available, these experiments will include the supplementation of fish rations with 1 or more antibiotics, and investigate the possibility that the "yellow fat" disease in mink may be caused by a vitamin "E" avitaminosis. If our 1951 marten production warrants it, a feeding experiment will be carried on with these animals during the summer and fall months. This will include the use of salmon waste and antibiotics.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Red snapper (red cod) is inferior to salmon, salmon cannery waste, flounders, and grey cod in the ration of ranch mink from a reproduction and health standpoint. Health and fur quality of animals receiving 40% or more of this fish was very poor. Contrary to last year's report, standard silver foxes will breed and reproduce on rations containing high percentages of Alaska fish products. The high mortality usually experienced among fox pups from 1 to 3 months of age, whose dams have received 50% or more halibut heads in their rations, can be averted by substituting 10% horse meat and 40% red snapper for the halibut heads when the pups are from 3 to 4 weeks of age. In Alaska, the latter part of June, July and forepart of August is the most critical period for young mink. Losses from "yellow fat" during this period vary with the percentage of salmon products in the ration, and previous feed the animals have received.

10. PROGRESS DURING THE YEAR: Four feeding experiments were carried on this past year - 2 with mink and 2 with blue foxes. Mink Experiment No. 18 compared 4 rations: Lot I - 80% canned salmon waste, Lot II - 80% frozen salmon waste, Lot III - 75% frozen whole salmon, Lot IV - 70% frozen ling cod, in the diet of female mink during their breeding, gestation, and suckling period. The Lot II ration was the best from a production standpoint, with an average of 3.4 kits whelped per female started on experiment, and Lot IV the poorest, with an average of 2.4 kits. Lot II had the lowest mortality, losing only 2 kits prior to weaning, and Lot III the highest, with 8 losses. The Lot II ration was also the most economical. Mink Experiment No. 19 carried 4 lots of 86 mink through their growing and furring out period, on rations containing: Lot I - 65% flounders, Lot II - 80% salmon waste, Lot III - 82% salmon waste-without-heads, and Lot IV - 60% ling cod. To date, the pelts taken from animals on this experiment have not been graded by fur experts. Our results indicate that Lot III was the best from a health standpoint, had the lowest number of poor skins, and made satisfactory gains in weight. Lot IV had the highest mortality, the largest number of poor skins, and had below average weight increases. Excellent breeding was obtained on both lots of Fox Experiment No. 17, which compared 2 lots of blue and white foxes receiving: Lot I - 60% flounders, and Lot II - 30% salmon waste and 30% red snapper during their breeding, gestation and suckling periods. However, production was very poor in Lot II, with an average of only 3.0 pups weaned per female started on experiment. Lot I production was satisfactory, with an average of 5.0 pups. Health was satisfactory in both lots, but the Lot I pups made the best gains in weight, and averaged nearly ½ pound heavier at weaning time. Fox Experiment No. 18 compared rations containing: Lot I - 45% halibut heads and 10% seal meal, and Lot II - 55% salmon waste and 10% seal meal, through the growing and furring out period. The cereal content of these rations was increased by 10%, and the fish and seal meal decreased by 10% and 3% respectively, on October 15, to determine if an increased percentage of cereal would result in pelts of better quality.

Lot I was the best from a health standpoint, and no animals were lost in this lot throughout the entire experiment. Both lots made equal gains in weight, and the Lot I ration was slightly more economical than Lot II. The pelts from these animals have not been graded by the fur experts yet, so no conclusions can be drawn as to fur quality.

11. PUBLICATIONS: None. Report on utilization of cannery salmon waste for mink feed nearly completed.

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
In cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-7(T)

2. PROJECT TITLE: Cross Breeding of Various Fur Animals for Hybrid Vigor, Mutation Fixation, and Fur Quality

3. PERIOD COVERED BY REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER: James R. Leekley

5. LOCATION: Experimental Fur Station, Petersburg, Alaska

6. COOPERATION: Bureau of Animal Industry

7. OBJECTIVE: To cross blue foxes, Arctic white foxes, and mutation blue foxes, in order to determine their dominance and color variations, and possibly produce a new mutation blue fox. To increase the quality of the station mink herd by the introduction of high quality mink purchased in the States and wild mink trapped in various localities in Alaska; to obtain consistant reproduction of marten.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: The selected group of 15 blue, Arctic white, blue-white cross, and mutation blue female foxes kept for breeding purposes, will be bred to various color phase males, in accordance with a prearranged schedule, in an attempt to determine the dominance of the mutation blue and Arctic white fox, and the percentage of white, blue or mutation offspring resulting from such matings. The two pair of wild tundra mink acquired last September, will be bred to the best station stock, to improve our herd and determine the advisability of breeding this type of mink to mutation mink. If the female marten, bred last summer, produce satisfactorily, we will have enough animals to set up a controlled marten experiment.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH WOULD JUSTIFY CONTINUED SUPPORT OF THIS WORK: The results of only 1 mating between an Arctic white and mutation blue fox, indicate that the offspring of such a cross can be distinguished by a small white blaze between their eyes, their large size, and white tips on their toes. There does not seem to be any definite segregation of color factors when Arctic white and ordinary blue foxes are crossed. The percentage of white and blue offspring resulting from

second and third generations of such matings do not follow a definite color pattern. The results of breeding good quality mink purchased in the States to our old station stock, indicate that the so-called "Blue Diamond" mink breed early, and are difficult to raise on diets usually fed Alaska mink.

10. PROGRESS DURING THE YEAR: A breeding program was started to determine the dominance and color characteristics of the Arctic white, blue, and mutation blue fox. Because of the small number of foxes available and the fact that it is impossible to adhere to a prearranged breeding schedule, this program will no doubt take several years to complete. Two pairs of wild-caught tundra mink were obtained this past summer for breeding purposes. Nine female marten were bred this past summer. Five of them were animals which were 3 to 4 years of age, but had never mated heretofore.

11. PUBLICATIONS: None.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-8(F)

2. PROJECT TITLE: The Effect of "Free-Choice" Feeding of Chickens on Growth and Egg Production under Alaskan Environmental Conditions

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER: William J. Sweetman

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Alaska Experiment Station and Agricultural Research Administration

7. OBJECTIVE OF WORK: To study the effect of free-choice feeding of mash and grain on growth and egg production, to determine the optimum level of protein in the mash to be used in a free-choice system of feeding, and the effect of confinement as compared with range on growth and subsequent production.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This experiment has been discontinued because most of the chicken house is being used to determine the insulation and ventilation requirements for hens in Alaska.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Hens raised on range produced considerably more eggs than hens raised in confinement. The 18% and 25.5% protein ration produced more eggs than the 32% protein ration.

10. PROGRESS DURING THE YEAR: There was no significant difference in rate of growth between self fed and hand fed chicks. The egg production was lowest in the pens receiving the free-choice 32% protein mash. The 18% and 25.5% protein ration were almost the same, but considerably above the high protein pens. The production per hen over an 8-month period was 132 eggs on 18% protein, 130 eggs on 25.5% protein and 119 eggs on high protein mash. Mortality was the same for all pens. The hens raised on range produced significantly more eggs than those raised in confinement; 137 eggs per hen were produced on range and 107 eggs per hen in confinement.

11. PUBLICATIONS: None.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-3-9(F)

2. PROJECT TITLE: The Effect of Different Levels of Manganese in the Diet of Hens and Pullets.

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: William J. Sweetman and Fred Swingle

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Alaska Experiment Station and Agricultural Research Administration

7. OBJECTIVE OF WORK: To determine if Alaska-grown grains are inadequate in manganese for egg production and to study the effects of low, medium and high levels of manganese with adequate amounts of vitamin D on egg production.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Only 2 pens of pullets were available for this experiment this past year. We will have a number of pullets on this experiment this coming year.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTIMUED SUPPORT OF THIS WORK: There does not seem to be any shortage of manganese in Alaska grown grains for old hens. At least it does not show up for a 5-month winter laying season.

10. PROGRESS DURING THE YEAR: Only 2 pens of pullets and 2 pens of 1 year old hens were available for this study. There were no differences in production in either the hens or pullets. Pullets with extra manganese produced 13 eggs per month per pullet and without 13.22 eggs. Hens with extra manganese 8.7 eggs and 9.5 eggs without extra manganese.

11. PUBLICATIONS: None.

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-4

2. DIVISION: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Agricultural Engineering

5. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

6. SUPERVISORY LEADER: C. Ivan Branton

7. LOCATION: Alaska Agricultural Experiment Station, Palmer, Alaska

8. COOPERATION: Horticulture (participated in potato top killing experiments); Animal Husbandry (participated in poultry ventilation studies); Agronomy (participated in cereal drying and storage investigations); Agricultural Economics (participated in planning land clearing projects).

9. OBJECTIVE OF CURRENT WORK: To develop methods of utilizing local timber supplies which will furnish adequate protection from the rigorous climate, and be economically sound for agricultural enterprises; to adapt ventilation and construction methods so that structural deterioration will be minimized in farm homes and in dairy and poultry buildings; to develop equipment for economically drying cereal grains and forages; to study methods of increasing the economic return to potato growers by reducing losses in handling and storage.

10. PROGRESS DURING THE YEAR:

Uses of Native Lumber: Thirteen experimental buildings 4' by 6' inside with a 6' ceiling height were constructed to test the efficiency of various materials. One structure was built with conventional finished materials to be used as a standard of comparison for the 12 structures built of native materials. Native materials used in the experimental wall construction were spruce and cottonwood logs sawed on 3 sides; and spruce and cottonwood rough lumber sawed on 4 sides; units were constructed with and without vapor seals in order to observe the differences in performance. All units were equipped with thermostats and electrical heat to hold the temperature at 70°F and with humidity controlling equipment to maintain the humidity at any predetermined point. Under test conditions 70°F and 40% relative humidity is being maintained.

Poultry House Ventilation Studies: Four experimental pens were equipped with ventilating flues at the Matanuska Station. Two pens are unheated except for the heat of the birds and the other 2 pens are held to a minumum of 40°F. One of the unheated pens and one of the heated pens has natural ventilation using ventilating flues and the other is equipped with the ventilating flues plus a small electric ventilating fan. Construction was completed and this experiment is being conducted during this winter season.

Drying Equipment: A combination drier was constructed at the Fairbanks Station which can be used to dry cereal grains, forages, and small samples from plot studies. This drier was completed too late in the season for use with forages; however, the cereal grain produced at Fairbanks will be dried using this equipment. Heat is supplied from a steam boiler located in the basement of one of the buildings. Both the drier and the steam line were installed using money from the Territorial Legislature. At the Matanuska Station the hay drier was remodeled by installing a large centrifugal type fan, increasing the size of the air distribution ducts, and equipping the drier with a unit heater which can be used after the completion of the garage and storage building in the summer of 1951.

Circular Bin Drier at Matanuska: To prevent the loss of valuable seed and to have a means for drying cereals produced at the Matanuska Station, the circular bin was installed this season. Heated air was obtained from the heating plant in the garage at Matanuska; and although the volume of the air was small the seed grain was dried in the drier, and it is planned to dry the remaining cereal grains before spring.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Projects have been set up and equipment secured; however, there are insufficient results to date to justify a statement under this paragraph.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Comparative performance studies on the 13 buildings constructed for a study of native materials will be continued. Studies of poultry ventilation methods are to be continued at the Matanuska Station. It is planned to dry hay at both Fairbanks Station and Matanuska Station using supplemental heat and the centrifugal blowers. Feeding trials by the Animal Husbandry Department have been used to evaluate the results obtained. Cereal grain will be dried at both Matanuska and Fairbanks Stations. Storage studies will be continued to determine the effect of moisture content on germination and keeping quality of the cereal grains.

ALASKA AGRICULTURAL EXPERIMENT STATION
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Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-4-1 (F)

2. PROJECT TITLE: Investigations to Develop Improved Structures, Equipment, and Methods of Handling and Storing White Potatoes.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: M. F. Babb, Horticulturist and C. Ivan Branton, Agricultural Engineer.

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Horticulture Department

7. OBJECTIVE OF WORK: To reduce potato weight and quality losses from the field through storage.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Major emphasis during the coming year will be placed upon the research to study the effect of killing the vines to induce maturity of the tubers. It is hoped that a suitable treatment may reduce feathering of the tubers and reduce damage in digging. Both mechanical methods and chemical methods of vine killing will be employed.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: This is the first season for this cooperative work between the Agricultural Engineering and Horticulture Departments. There are no important contributions to report at this time.

10. PROGRESS DURING THE YEAR: A single variety of potato was chosen and various plots treated using 2 mechanical and 6 chemical methods for stopping top growth. The grading of the tubers from the plots so treated for growth and digger cracks did not show significant differences. An examination of the cut tubers for stem end browning will be made. The harvest season was exceptionally long and dry. There is a possibility that the treatments used may show an advantage in a more normal year.

11. PUBLICATIONS: None

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-4-3 (BJ)

2. PROJECT TITLE: Determination of the Insulation and Ventilation Requirements of Farm Structures and the Development of Improved Methods of their Construction Under Alaska Climatic Conditions.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: C. Ivan Branton, Agricultural Engineer and W. J. Sweetman, Animal Husbandman.

5. LOCATIONS: Matanuska Experiment Station and Agricultural Research Administration Laboratory.

6. COOPERATION: Animal Husbandry Department

7. OBJECTIVE OF WORK: To develop economically feasible methods of construction, insulating, vapor sealing, and ventilating agricultural structures in Alaska, using native materials and labor supplies to the maximum extent possible.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Two phases of work are under way under this project. The first phase is the investigation of methods of utilizing local timber in building farm structures suitable to Alaska. During the coming year data will be accumulated on the power consumption, temperature, and air resistance on 13 structures built with experimental walls. Twelve of the buildings have walls constructed of various combinations of native materials. The performance of these 12 wall sections will be compared to one standard building having walls constructed of conventional imported materials. The other phase of this project consists of a study of the effect of natural and forced ventilation in four experimental poultry pens. Data has been taken throughout the winter, and it will then be analyzed to study the effect of the moisture condition of the litter, the animal health, and the egg production during the laying season as it may be effected by ventilation of the pens.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: These projects are in their first season and no data has yet been evaluated from the experiments. Proper use of native materials in

agricultural building construction should result in material savings to the public over a period of years.

10. PROGRESS DURING THE YEAR: The 2 phases of investigation will be discussed separately under this heading.

Uses of Native Material: Thirteen experimental structures were erected by local contractor. One of these structures was intended as a standard and was built with conventional frame construction using the conventional materials available for better class house construction. Two inch commercial bat insulation was installed between the studding with an interior finish of celotex. Twelve structures identical in size to the conventional frame unit were built using various combinations of rough sawed native material. Spruce and cottonwood logs were used, 2 structures being built from logs sawed when green and 2 structures being built from logs sawed when dry for each variety of material. All log structures consisted of rough sawed material on 3 sides with the thickness of approximately 6 inches after sawing. Four structures were built using rough sawed lumber from green material with sawdust and sphagnum moss as insulation material. All structures had identical window and door treatment. Six of the 12 structures were equipped with vapor seals on the interior of the structure. Each experimental structure is heated by a thermostatically controlled electric heater holding the temperature at 70°F. Automatic humidity control equipment holds the relative humidity at 40%. The performance of the various wall sections are being tested under the extremes of temperature and wind during the Alaskan winter. The performance of identical structures with and without vapor seal will be observed.

Ventilation of Agricultural Structures: Four experimental pens were equipped with ventilation flues at the Matanuska Station. Into these pens lots of randomized pullets were placed and observations were begun in an effort to determine whether the maintainance of a minimum of 40°F in the pen gives better results than in pens where no heat was applied. Two of the four pens are equipped with fan ventilation in an effort to observe whether or not the use of the fan will improve egg production. An electrical power outage of approximately 36 hours may have disturbed the experiment since pens normally receiving the heat were subjected to cold conditions.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-4-4 (F)

2. PROJECT TITLE: Cost of Land Clearing and Economic Utilization of Natural Forest Products.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: C. Ivan Branton and H. A. Johnson

5. LOCATION: Matanuska Experiment Station.

6. COOPERATION: Agricultural Economics

7. OBJECTIVE OF WORK: To develop land clearing methods which may be adapted to Alaskan conditions of topography, soils, forest cover and agriculture use.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: It is not expected that work can be started on this project during the year since a considerable amount of operating money would be required to properly set up the project.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: No work has been done on the project to date.

10. PROGRESS DURING THE YEAR: The planned work was canceled because of priority placed on other projects.

11. PUBLICATIONS: None

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-4-5 (F)

2. PROJECT TITLE: Handling and Storing High Moisture Content Cereal Grain.

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADERS: C. Ivan Branton, Agricultural Engineer and S. C. Litzenberger, Agronomy Department.

5. LOCATIONS: Matanuska Experiment Station and Fairbanks Experiment Station.

6. COOPERATION: Agronomy Department

7. OBJECTIVE OF WORK: To determine the most practical method of drying cereal grains in Alaska for feed production and for seed production and also to determine the optemum moisture content of grains for maximum retention of viability.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Major empasis during the coming year will be placed upon studies relating to the determination of the optimum moisture content of the grain to prevent spoilage in storage and to maintain optimum viability as measured by percentage germination.

The circular drier at Matanuska Station will be used to dry all the grain still on hand from the 1950 season prior to the warm spring weather. Grain will be stored in steel oil drums at approximately 18, 16, 14, and 12% moisture. Observations of these lots during the spring will supply data on the safe moisture level for grain storage. The 1951 grain crop will be dried prior to freezing weather and the storage experiments repeated. The effect of freezing upon germination of grain when stored at various moisture levels will be obtained, as well as data upon the moisture level for safe storage.

Storage of grain at various levels of moisture content will be repeated at the Fairbanks Experimental Farm, with the drying accomplished prior to freezing to make possible the accumulation of data on the effect of moisture content of grain in storage at sub-zero temperature upon the germination.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Progress under this project has not been sufficient for the release of information to the public to date.

10. PROGRESS DURING THE YEAR:

Moisture Content of Cereal Grains as Harvested: The summer of 1950 was exceptionally favorable to the maturity of cereal grains. Spot checks of the following varieties of grain indicated the moisture content to be as follows when the grain was cut in the field for binding. (Moisture percentages on a wet basis) Wheat 31.5%; Vicland Oats 27.3%; Ollie Barley 26.2% and Edda I Barley 12.3%. Edda I Barley was the only variety sufficiently mature that artifical drying would not have been desirable.

Grain Drying Equipment: A column type drier was built at the Fairbanks Experimental Farm which consisted of 6 columns 3' by 4' in cross sectional area and 6" in thickness. It will dry approximately 30 bushels of grain per loading. Heat was obtained from a fin type steam coil capable of raising the temperature of 6,750 cubic feet of air per minute 80°F.

Circular Steel Grain Storage Bin: At the Matanuska Station a 1000 bushel capacity steel grain storage bin was erected. A supply of heated air was obtained from the oil furnace installed in the shop building, sheet metal connections being made so as to permit air to be forced through the slotted bin floor and through a layer of grain.

Neither of the above driers were completed in time for normal use as the grain was harvested; however, considerable data has been accumulated from the operation of the Fairbanks drier and a limited amount has been obtained from the operation of the circular bin at the Matanuska Station.

Grain Storage Experiment: At the Fairbanks Station using the column type drier wheat, oats, and barley have been dried to four moisture levels; 18, 16, 14, and 12%. Grain at these moisture levels has been stored in 50 gallon steel drums. Observations are being made of the temperature of the grain and it is anticipated that an indication will be obtained of the moisture level at which the grain will go out of condition in the spring. Drying time, drying temperatures, static air pressures, heat supplied, and moisture differentials have been taken in the experimental work at the Fairbanks Station; however, the data has not been correlated at this time.

In the circular bin at the Matanuska Station oats were dried from 18.7% moisture to 10% moisture in 17 hours. Oil consumption was 0.24 gallons per bushel.

11. PUBLICATIONS: None

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-5

2. DIVISION: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Agricultural Economics

5. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

6. SUPERVISORY LEADER(S): Hugh A. Johnson

7. LOCATION(S): Alaska Agricultural Experiment Station, Palmer, Alaska

8. COOPERATION: Informal cooperation with other Departments of the Station and with other government agencies.

9. OBJECTIVE OF CURRENT WORK: To analyze the relationships of production practices to the enterprise costs and returns of farming in Alaska and to provide information to farmers interested in improving their farming conditions; also to analyze the present and potential market for products of Alaska's farms that present products may be fully utilized and that future production may be geared to the market needs of the period.

10. PROGRESS DURING THE YEAR: Farm management records on 1949 farm operations taken during the winter of 1949-50 were analyzed and a report was written. A revised interviewing form was prepared for the record of 1950 farm operations and farms in the Fairbanks area were visited (AL-1-5-1). A detailed study of the production and marketing prospects of the Kenai Peninsula was conducted and 2 reports prepared for publication.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: The current project in farm management accounts is the first attempt in Alaska at acquiring accurate data on costs and returns for various kinds of farms in the Territory. A series of enterprise analyses including methods of doing various jobs is being conducted to further aid in the study of better farm organization. Farmers will be able to apply the knowledge of less expensive farming methods and techniques to their own operations and thus enjoy better conditions through more profitable farming. The reprot on 1949 farm operations is indicative, but the project must be continued for several years before variations in input-output factor relationships can be isolated from variations caused by weather and climatic conditions that cannot be controlled by man. A preliminary report of the findings was duplicated and distributed to cooperating farmers and other interested persons.

The marketing research has been oriented to defining and describing the potential market for farm products of the Central Alaska area. The studies this year centered on the Kenai Peninsula, its particular attributes and its market problems.

Two reports were prepared. One, examining the potential market for a possible group settlement project was submitted to the Department of Interior-Department of Agriculture Committee on Group Settlement in Alaska as an aid in its deliberations. A second report, written in popular style, was prepared following a study of 127 rural settler families during the summer of 1950. In this report are portrayed the socio-economic conditions of settlers on the Kenai Peninsula, and their present conditions are keyed to the potential market for farm products from the area. This report has been submitted for publication as a Station bulletin because of its valuable information for families wanting to develop homesteads.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Farm cost and return analyses will be continued with greater emphasis on improved farm accounts and with more detail on certain farm enterprises (AL-1-5-1). Special attention will be given to the effect of variable quality of perishable products on their demand in local markets and to ways of improving the keeping qualities of perishables on display (AL-1-5-2).

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-5-1 (F)

2. PROJECT TITLE: Basic Economic Study of Farm Management and Production in Middle Alaska.

3. PERIOD COVERED BY THIS REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER(S): Hugh A. Johnson and Clarence A. Moore

5. LOCATION(S): Alaska Agricultural Experiment Station, Palmer, Alaska

6. COOPERATION: Informal cooperation with other departments of the Station and with other government agencies.

7. OBJECTIVE OF WORK: To assemble and analyze farm management and production data essential to more effective use of resources on established farms and to the sound guidance of settlement and development of new agricultural areas in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Special attention in 1951 will be given to acquiring more accurate enterprise data, more complete and accurate cost and return data and greater detail on practices. Basically, the same types of information must be gathered for several years before factors not associated with weather and climate can be isolated.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: This year's work shows that great changes apparently are occurring in Alaska's agriculture. Dairying is increasing in the Matanuska Valley. Yet, dairying seems to pay less well at present than truck farming combined with non-farm work. Changes in farming methods should result in lowered costs of farming and may be reflected in further changes over the next few years. Evidence of this is in the increased interest in silage and in efforts to maintain forage quality through the winter.

10. PROGRESS DURING THE YEAR: Calendar 1950 was spent in taking and analyzing records of farm enterprises on 77 farms in the Matanuska Valley, in preparing a report of findings and in preparation for a similar study of farm operations during the 1950 cropping season. A manuscript was submitted for publication at the end of the year.

11. PUBLICATIONS: Publication as a mimeograph report of the Experiment Station was made early in 1951.

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
In cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-5-2(R)

2. PROJECT TITLE: Markets for Alaska's Agricultural Products

3. PERIOD COVERED BY THE REPORT: January 1, 1950 to December 31, 1950

4. SUPERVISORY LEADER(S): Hugh A. Johnson

5. LOCATION(S): Alaska Agricultural Experiment Station, Palmer, Alaska

6. COOPERATION: Informal cooperation with other Departments of the Station and with other government agencies.

7. OBJECTIVE OF WORK: To assemble and analyze information concerning the nature and adequacy of marketing, processing, storage, transportation, and other services available to present and prospective farmers in Alaska; to indicate desirable improvements in such facilities and services; and to measure the anticipated potential market for agricultural produce in Alaska.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Special attention in 1951 will be given to the effect of variable quality of perishable products on their demand in local markets and to ways of improving the keeping quality of perishables on display.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: This project is the only current work in the Territory which provides vital background marketing information from which new marketing alignments can be evolved. While no new principles have been developed, application of known principles to local conditions has been valuable in orienting the size and characteristics of our local market to the potential supply of locally produced perishable products.

10. PROGRESS DURING THE YEAR: Calendar 1950 was spent on a detailed study of the potential production prospects and the potential market prospects of the Kenai Peninsula area. This area was examined critically to determine its logical place in the agricultural economy of the Territory. All homesteaders and settlers on the Peninsula outside the settlements of Homer, Ninilchik, Kasilof and Kenai were interviewed concerning their present and future plans.

An unpublished report, "Marketing Problems Confronting Settlement of the Kenai-Kasilof Withdrawn Area" (38 pp ditto) was prepared for the U. S. Department of the Interior-Department of Agriculture Joint Committee on Group Settlement in Alaska.

A manuscript, "Agricultural Possibilities of Alaska's Kenai Peninsula," has been submitted to the Director for publication as a Station bulletin.

11. PUBLICATIONS: Publications are in final manuscript form.

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-6

2. DIVISION: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Field Crops Investigations

5. PERIOD COVERED: January 1 to December 31, 1950

6. SUPERVISORY LEADERS: H. J. Hodgson and S. C. Litzenberger

7. LOCATIONS: Matanuska and Fairbanks Stations

8. COOPERATION: Animal Husbandry Department (participated in pasture and feed processing studies); Agricultural Engineering Department (participated in feed processing studies); Soil Conservation Service, On-the-Farm Training Program, and Extension Service (participated in uniform cereal and forage nurseries throughout agricultural areas of Alaska); Bureau of Plant Industry, Soils, and Agricultural Engineering; and various state agricultural experiment stations.

9. OBJECTIVES OF CURRENT WORK: (1) To breed alfalfa for production of strains more winter hardy, higher yielding, and disease resistant and to establish foundation seed supplies for Alaskan growers; (2) to breed bromegrass for development of strains superior in forage and seed production, disease resistance, and compatability with established legumes and to establish foundation seed supplies of superior lines; (3) to breed cereals for Alaska with earlier maturity, higher yields, disease resistance, and stiff straw and to increase and release the varieties developed; (4) to test introduced and native grasses and legumes for adaptability and winter hardiness; (5) to determine optimum methods of culturing recommended cereal crop varieties under Alaskan conditions including methods of seeding, rate and date of seeding, fertilizing, or any other cultural practice that appears worthy of investigation; (6) to evaluate native and cultivated grasses and legumes under different grazing and management systems; (7) to determine the relative efficiency and feeding value of various native and introduced grasses and legumes in mixtures for hay, pasture, and silage purposes; (8) to test various mixtures of native and introduced grasses and legumes and to measure their comparative value under various types of utilization; (9) to develop a system of weed control in field crops to increase production of forage and cereal crops; and (10) to test United States introduced and developed strains of cereal crops for subarctic breeding and production.

10. PROGRESS DURING THE YEAR: Forage Investigations - AL-1-6-1: Open pollinated seed was harvested from about 200 selected plants of Medicago falcata and M. sativa. Some degree of resistance to shattering was identified in a few plants of the former species. Intercrosses were made between plants of a single M. falcata x M. sativa cross and several thousand seeds were matured. Seed of M. falcata was furnished several agencies for seed production studies. AL-1-6-2: Uniform bromegrass variety trials for the North Central States were seeded at 2 locations and satisfactory stands were secured at 1 location. A number of outstanding plants were vegetatively propagated from the breeding nursery into plots for yield comparisons and open pollinated seed was collected from these plants. AL-1-6-4: Of about 150 forage entities tested, smooth bromegrass, meadow foxtail, red fescue, yellow-flowered alfalfa, and possibly timothy appeared to possess superior germ plasm for use as perennial species. About 75 new entities of grasses and legumes were planted this year of which 26 are new alsike clover introductions. One alsike clover, 1 red clover, and 3 sweetclover strains satisfactorily survived the winter of 1949-50 and the first 2 are being increased. A sweetclover variety trial was seeded again in 1950. Data were obtained on first-year performance of 8 grasses and 6 legumes seeded at 12 locations in agricultural areas of Alaska. AL-1-6-6: Renovation of unproductive bromegrass pastures continued to increase yields but not to the extent that fertilization can. A combination of these 2 practices would probably give greatest increases in yield. AL-1-6-7: Second cutting bromegrass processed as silage and barn dried hay were 33 and 13 percent more efficient per pound of dry matter when fed to milking Guernsey cows than similar forage processed as field cured hay. Average costs per ton of dry matter were $18.05, $28.56, and $28.43 for silage, barn dried hay, and field cured hay, respectively; and dry matter losses from cutting to storing were 21.0, 28.6, and 41.1 percent, respectively. When oats-and-peas processed in 1949 as field cured hay and silage were fed to dairy heifers, 25.20 and 6.85 pounds of dry matter, respectively were required per pound of gain in weight. Feeding value of good oat-and-pea and bromegrass silage were about equal. AL-1-6-8: No significant differences were found this year in yields of various grass-legume mixtures established in 1949 at 2 locations. Recovery was very slow as a result of dry weather and only 1 cutting was obtained. Differences were found in winter survival and yield differences should appear in 1951.

Cereal Investigations - AL-1-6-3: In rod-row trials at the Matanuska and Fairbanks Stations, about 100 barleys, 75 oats, 80 wheats, 70 flaxes, 7 buckwheats, and 3 millets were evaluated for adaptation and agronomic desirability. Head-row plantings of wheat, oats, and barley numbered over 1,500 at the Matanuska Station and 171 were saved for further testing and advancement. Record mean yields were obtained with oats and barley. All flax and buckwheat varieties matured excellent seed crops while millet was a complete failure. All crop varieties matured almost a month earlier at Fairbanks but varietal responses differed little from

those at Palmer. Quality analyses show that none of our cereals have been found to be inferior to similar varieties grown in comparable environments in the States. About 6 tons of Edda barley and 12 tons of Golden Rain oats were increased for subsequent release to Alaska farmers in 1951. Twenty-six Uniform Cereal Trials including 10 of the most promising oats, barleys, and wheat were planted throughout the Territory. AL-1-6-5: Edda barley, Golden Rain oats, and Khogot wheat were planted in replicated tests at 3 dates, 3 rates, and 17 fertility levels. Optimum yields were obtained with the May 22 planting, at the heavier rates, and at the highest nitrogen level used. No differences between potash and phosphorous levels were observed. Lindane at the 3-pound rate gave complete control of wireworms in barley. AL-1-6-10: The World Barley Collection, numbering 5,215 varieties, was planted in single 5-foot rows at the Matanuska Station for thorough agronomic evaluation. The 368 most promising varieties were harvested for further testing.

Weed Control Investigations - AL-1-6-9: One-fourth pound of ester form of 2,4-D most satisfactorily controlled lambsquarters in cereals while early spray applications at 16-1/2 pounds per acre of Aero Cyanate gave best results with chickweed. Post emergence applications of Dinitro at 1 gallon per acre appeared most promising as a general selective herbicide for oats-and-peas for forage as it resulted in 96 percent control of chickweed and lambsquarters. Excellent kills were obtained on woody species with 2,4,5-T.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Since the last report this work project has contributed new Experiment Station Circulars - Circular 13, Fertilizers for Alaska, 1951, and Circular 14, Recommended Varieties of Field Crops for Alaska, 1951. Two superior cereal varieties, Edda barley and Golden Rain oats, have been recommended and are being released in 1951 to Alaska farmers.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Special emphasis will be placed on progeny testing of selected alfalfa and bromegrass plants, further selection to be practiced within species and in segregating populations resulting from species hybridization, seed production studies on Medicago falcata; evaluation of introduced forage crop strains (AL-1-6-1, AL-1-6-2, and AL-1-6-4); combining earliness and smut resistance of Eaton and Cherokee oats with the high yield of Climax and Golden Rain, locating earlier germ plasm for hybridization with Khogot wheat, and testing Tartary buckwheat for rutin content (AL-1-6-3); extending the work on seeding and fertilization practices as related to production of cereal crops (AL-1-6-5); comparing fertilization and renovation as economical means of increasing pasture production (AL-1-6-6); use of supplemental heat and larger fans in drying hay (AL-1-6-7); testing various mixtures of annual and perennial grasses and legumes (AL-1-6-8); selective control of weeds in cereal and forage crops (AL-1-6-9); growing the World Collections of Oats and Flax Varieties at the Matanuska Station (AL-1-6-10).

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-1(A)

2. PROJECT TITLE: Alfalfa Breeding - Foundation Seed Production

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson and S. C. Litzenberger

5. LOCATIONS: Matanuska and Fairbanks Stations

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases)

7. OBJECTIVE OF WORK: To obtain by selection, hybridization and other breeding methods, varieties of alfalfa suitable for use under the soil and climatic conditions of the Matanuska and Tanana Valleys; to establish foundation seed blocks of superior strains for eventual release and distribution.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This project has been recommended for discontinuance and the work performed hereunder will be combined into proposed project AL-1-6-11(A), Forage Crop Breeding.

Major alfalfa work will consist of (1) testing open pollinated progenies of selected plants, (2) establishing for observation segregating populations from Medicago falcata x M. sativa hybrids, (3) testing introduced strains of M. sativa at Fairbanks, (4) continued selection of desirable phenotypes in M. falcata. A survey of diseases prevalent in alfalfa will be made in cooperation with the new department of Plant Pathology.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Work on this project to date has not produced results which are direct contributions to public welfare. Breeding projects usually require long periods of research before benefits are derived.

10. PROGRESS DURING THE YEAR: Of the 30 alfalfa varieties seeded at the Matanuska Station in 1949, Grimm exhibited a partial winter survival, yellow-flowered alfalfa survived 100 percent, and all others were completely eliminated.

Approximately 100 plants of yellow-flowered alfalfa (M. falcata) were selected from breeding nurseries and old stands this year on the basis of vigor, growth habit, freedom from disease, seed set, and resistance to shattering. The fact that a number of plants appeared to possess at least some degree of resistance to shattering is particularly encouraging as the failure to hold its seed has been one of the principal deterrents to increase and distribution of this legume. Intercrosses were made between 8 F_1 plants resulting from a M. falcata x M. sativa cross and several thousand seeds were matured. Seed was harvested from about 100 plants which were selected at Fairbanks from a nursery of open pollinated progeny from plants of M. sativa which had survived several winters. Open pollinated progeny tests will be begun on this material in 1951. A Station representative attended the International Alfalfa Improvement Conference held at Lethbridge, Alberta, Canada, July 31 through August 2, where many valuable contacts were made. Visits were made to several Canadian stations and seed of creeping rooted alfalfa was procured from the Station at Swift Current, Saskatchewan. Arrangements were made to ship clonal material of a number of outstanding creeping rooted plants to Alaska in the spring of 1951.

11. PUBLICATIONS: Work done on this project contributed to Experiment Station Circular 14, Recommended Varieties of Field Crops for Alaska, 1951.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-2(F)

2. PROJECT TITLE: Bromegrass Breeding - Foundation Seed Production

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson and S. C. Litzenberger

5. LOCATIONS: Matanuska and Fairbanks Stations

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases)

7. OBJECTIVE: To develop strains of bromegrass having superior forage and seed production qualities, resistance to disease, compatability with legumes and other desirable characters; to establish foundation seed blocks of superior strains for eventual distribution to farmers.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This project has been recommended for discontinuance and the work performed hereunder will be combined into proposed project AL-1-6-11(A), Forage Crop Breeding. Evaluation of the strains comprising the North Central States uniform bromegrass variety trial established in 1950 will be continued. The trial that failed at Fairbanks will be replanted. New and larger breeding nurseries will be established including open pollinated progeny from Bromus inermis x B. pumpellianus hybrids, introduced strains, and individual plant collections from old stands.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Work on this project to date has not produced results which are direct contributions to the public welfare. Breeding projects usually require long periods of research before benefits are derived.

10. PROGRESS DURING THE YEAR: Uniform bromegrass variety trials for the North Central States were seeded at the Matanuska and Fairbanks Stations. The trial at Fairbanks failed as a result of drought, but satisfactory stands were obtained at Matanuska. Hay yields will be obtained in 1951. A number of vigorous plants from the breeding nursery were vegetatively propagaged into plots for yield comparisons. Open pollinated seed was obtained from several of these plants and will be used in evaluating them in 1951.

11. PUBLICATIONS: None.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-3(H) (Rev. July 1, 1950)

2. PROJECT TITLE: Cereal Crop Breeding

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER: S. C. Litzenberger

5. LOCATIONS: Matanuska and Fairbanks Stations, Research Laboratory at Palmer, and other locations throughout the Territory where the Uniform Alaska Cereal Trials were grown.

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Cereal Crops and Diseases) and other state, Federal, and Territorial agencies.

7. OBJECTIVE OF WORK: To develop and release to growers in Alaska improved varieties of cereal crops, these crops having been improved by breeding.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Because greenhouse facilities were lacking and insufficient personnel were available to effect contemplated oat crosses, special attempt will be made again to combine earliness and smut resistance of Eaton and Cherokee with later maturing, smut-susceptible, higher yielding varieties Climax and Golden Rain. A further attempt will be made to locate earlier germ plasm (by at least 10 days) for hybridization with Kohgot wheat. Tartary buckwheat plantings will be thoroughly analyzed for rutin. In 1950 this variety grew to nearly 7 feet in height at Palmer.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Golden Rain oats and Edda barley were increased to about 40,000 pounds for release to Alaska farmers for planting in 1951. Both varieties have been placed on the 1951 Alaska cereal variety recommendation list. In addition to being superior in grain yielding ability, they are stiff-strawed, relatively early, and laboratory analyses show them to be at lease equal to other varieties grown in Alaska for feed and food uses. Markhinetz, a new hulless barley commercially available, is also to be recommended to replace Trapmar in 1951. The 1951 varietal recommendations were materially supported by results obtained from the Uniform Alaska Cereal Trial first begun in 1950.

10. PROGRESS DURING THE YEAR: Cereal crop investigations in 1950 under this project included major nursery trials in various stages of advancement and pure seed plantings of about equal scope at the Matanuska and Fairbanks Stations. In rod-row trials about 100 barleys, 75 oats, 80 wheats, 10 flaxes, 7 buckwheats, and 3 millets were evaluated for adaptation and agronomic desirability. Head-row plantings of wheat, oats, and barley numbered over 1,500 at Palmer; however, only 171 were saved for further testing and advancement. Record mean yields were generally obtained with barley and oats at Palmer. The highest yielding oat was Golden Rain Sel. 5 with a yield of 139.0 bushels per acre. Golden Rain (Siberian 3 of former reports) averaged 105.8 bushels per acre in this same test. Edda II, Tammi, and Edda, the 3 highest yielding barleys, averaged 80.9, 80.4, and 80.3 bushels per acre, respectively. Markhinetz barley yielded 126 percent of Trapmar in the Palmer trial. Victory was the leading wheat variety, averaging 42.2 bushels per acre. All flax and buckwheats matured excellent seed crops. Millet was a complete failure.

At the Fairbanks Station grain yields were nearly normal although heavy weed competition, reduced stands, and early drought were probably responsible for generally lower grain yields. All crop varieties, especially the early strains, ripened earlier by almost a month. Under such conditions, even the millets produced seed. Varietal response differed little from those observed at Palmer. The newer releases, Golden Rain, Edda, and Markhinetz, all performed better than currently available varieties in the Tanana Valley.

Industrial outlets for Alaska-grown cereals are being intensively investigated. In addition to analyzing all varieties for proteins, certain barleys are being evaluated for malting and pearling, wheats for milling and baking, flax seed and straw for oil, linen and paper, oats for milling, and buckwheat as a source of rutin. To date, none of our cereals have been found to be inferior in quality to similar type varieties grown under the most comparable environments in the States.

About 6 tons of Edda barley and nearly twice that of Golden Rain oats were increased at College and Palmer on the Stations and under contract in cooperation with the Montana Agricultural Experiment Station at Bozeman and Huntley and 2 seedgrowers at Aberdeen, Idaho, for subsequent release to Alaska farmers in 1951. Certified seed of these 2 newly developed cereals is to be regularly produced by the newly proposed Alaska Certified Seed Growers Association, the plan of which primarily arose through efforts of this project.

Twenty-six Uniform Alaska Cereal trials including 10 of the most promising oats, barleys, and wheat were planted in cooperation with farmers throughout the agricultural areas of the Territory in conjunction with the Agricultural Extension Service and the On-the-Farm Training Program. More than half of these trials were harvested. Results have been summarized and furnished all cooperators.

11. PUBLICATIONS: Hodgson, H. J., S. C. Litzenberger, B. M. Bensin, and John E. Osguthorpe. Recommended Varieties of Field Crops for Alaska, 1951. Manuscript is in process of being printed as Station Circular 14.

Two manuscripts are in the process of preparation. One will give experimental results on Edda barley and the other on Golden Rain oats.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-4(T)

2. PROJECT TITLE: Adaptation Studies on Native and Introduced Grasses and Legumes

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson and B. M. Bensin

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases) and various other agencies

7. OBJECTIVE OF WORK: To determine the adaptability to Alaskan conditions of strains of grasses and legumes from various parts of the world.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This project has been recommended for discontinuance and the work will be combined into proposed project AL-1-6-11(A), Forage Crop Breeding. Evaluation of introduced strains and species of forage grasses and legumes will be continued at both Stations and the more promising entities will be further tested in various areas of the Territory.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: The work during the past 3 seasons has resulted in identifying those species which appear to have the greatest adaptation to Alaskan environments.

10. PROGRESS DURING THE YEAR: Of the 125 entities seeded in observational rows at the Matanuska Station in 1948, smooth bromegrass, meadow foxtail, and yellow-flowered alfalfa continue to appear most promising. In 1950, 50 additional entities were planted in observational rows. Twenty-six alsike clover introductions from Finland, Sweden, Germany, Russia, Turkey, and Australia were seeded in 5-foot observational rows and all made satisfactory growths this year. Of 12 sweetclover varieties planted in 1949, Arctic, Redfield, and Brandon Dwarf survived about 95 percent, while all others winterkilled completely.

Fourteen sweetclover varieties were seeded in 1950 and notes on various agronomic characters were recorded. Winter hardiness will be evaluated

in the spring of 1951. Yields ranged from 10 to 14 tons of green weight per acre. Of 11 clover varieties seeded in 1949, only 2 survived satisfactorily - a Finnish strain of alsike clover and a strain of red clover believed to have come from Russia a number of years ago. Seed was harvested from both strains this year and the latter is under increase at the Fairbanks Station, approximately 100 pounds of clean seed having been harvested in 1950. In cooperation with farmers in conjunction with instructors of the Veterans On-the-Farm-Training Program, Soil Conservation Service, and the Agricultural Extension Service preliminary forage trials were conducted at or near Homer, Anchor Point, Happy Valley, Kenai, Ninilchik, Hope, Soldotna, Seward, Anchorage, Chugiak, Palmer, Wasilla, Knik, Goose Bay, Gakona, and College. Eight grasses and 6 legumes were tested in these plantings with timothy, reed canarygrass, and alsike clover generally being outstanding in the first season. Winter survival and yields will be noted in 1951.

11. PUBLICATIONS: Work carried out under this project has contributed to Circular 12, Better Forage for Alaska, and Circular 14, Recommended Varieties of Field Crops for Alaska, 1951, of the Alaska Agricultural Experiment Station.

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-5(P)(Rev. July 1, 1950)

2. PROJECT TITLE: Cereal Crop Culture

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADER: S. C. Litzenberger

5. LOCATIONS: Matanuska and Fairbanks Stations

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Cereal Crops and Diseases) and other state, Federal, and Territorial agencies

7. OBJECTIVE OF WORK: To determine the optimum method of culturing recommended cereal crop varieties under Alaskan conditions including methods of seeding, rate and date of seeding, fertilizing, or any other cultural practice that appears worthy of investigation.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: The rate and date of seeding trial with Edda barley, Golden Rain oats, and Khogot wheat will be extended to include plantings on uplands and bottomlands at the Fairbanks Station in 1951. These and other currently recommended varieties will be grown at 4 levels of nitrogen per acre (0, 15, 30, and 45) at 2 locations to determine varietal response of cereals to soil nitrogen levels in Alaska.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Resulting from these investigations have been the current fertilizer recommendations for cereals and the increased benefits from early planting and sowing at abnormally heavier rates per acre. Rates of seeding cereals to date have not followed State-side dryland recommendations, but more nearly those of irrigated tests.

10. PROGRESS DURING THE YEAR: Edda barley, Golden Rain oats, and Khogot wheat were planted in replicated nursery trials at 3 dates (May 9, May 22, and June 5) and at 3 rates at the Matanuska Station. Optimum yields of grain and straw were obtained with heavier rates and May 22 plantings for all varieties. Earlier plantings probably yielded less because of reduced tillering and increased weed competition while

heavier rates resulted in heaviest yields because of an increased number of culms. Agronomic performance of the same 3 varieties was observed at 17 different fertility levels in 3 tests at 2 locations. No differences between levels of potash and phosphate were observed; however, optimum grain yields were obtained (also straw weights when taken) at the highest nitrogen level tested, 20 pounds per acre. Slight expected differences for other agronomic comparisons were observed for different nitrogen levels.

In a cooperative test with the Entomology Department, 1- and 3-pound rates of 5 potential wireworm insecticides were applied to wireworm infested soil in which later were planted Edda, Olli, and Trapmar barley. Only Lindane at the 3-pound rate resulted in complete wireworm control. The untreated checks averaged 1 plant killed per 4 square feet by the wireworms. No insecticide had any noticeable effect of any kind on the barleys.

11. PUBLICATIONS: Mick, A. H., H. J. Hodgson, and S. C. Litzenberger, General Fertilizer Recommendations for Alaska, Circular 13. 1951.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-6(F)

2. PROJECT TITLE: Pasture and Range Improvement and Management

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson and W. J. Sweetman

5. LOCATIONS: Matanuska and Fairbanks Stations

6. COOPERATION: Animal Husbandry Department; Bureau of Dairy Industry; Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases)

7. OBJECTIVE OF WORK: To determine the yield of native range, cultivated pastures (annual and perennial) under different grazing and management systems, and their effect on maintenance of stands of grasses and legumes in the Matanuska and Tanana Valleys; to determine the effects of different methods of grazing management on nutritive value of forage, milk production of dairy cows or beef production of beef cattle; to measure the comparative feed production in the form of hay, grains, and pasture; to determine the possibilities of establishing pastures on lands of limited crop value; to determine the value of renovation and reseeding permanent pasture sod to increase yields.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: The renovation experiment will be continued for at least 1 more year. Certain pastures will receive nitrogen fertilizers and comparisons will be made between renovation and fertilization as a means of increasing pasture yields.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Work on this project to date has shown that pasture yields in the year of renovation exceed those of check pastures and that yields continue to increase during the next 2 seasons even though legume stands winterkill during the first winter.

10. PROGRESS DURING THE YEAR: The third in a series of 4 pastures was renovated by disking and reseeding to bromegrass and white and alsike clover, the first and second having been renovated in 1948 and 1949,

respectively. Yields on all 4 pastures were measured by production of milking Guernsey cows. Average yields in terms of standard cow days per acre were: (1) check pastures, 46; (2) year of renovation, 51; (3) year after renovation, 63; (4) second year after renovation, 70. Relative yields were 100, 112, 137, and 154, respectively.

In a second series of pastures, Kentucky bluegrass, red fescue, renovated bromegrass, and a bromegrass check were compared. Pastures remained unfertilized except that 200 pounds of 7-21-15 fertilizer were applied per acre when the 1 pasture was renovated. Kentucky bluegrass consistently outyielded red fescue by about 9 standard cow days per acre per year and the bromegrass check by about 15 standard cow days per acre per year. Renovated bromegrass exceeded Kentucky bluegrass in the second year after renovation but previously was inferior on this set of pastures. While renovation will increase pasture yields, all indications are that fertilization, especially with nitrogen or a combination of renovation and nitrogen fertilization, will produce greatest increases in pasture yields.

11. PUBLICATIONS: None

ALASKA AGRICULTURAL EXPERIMENT STATION
Don L. Irwin, Director
In cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration

ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-7(P)

2. PROJECT TITLE: Feed Production, Processing, and Preservation

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson, W. J. Sweetman, and C. I. Branton

5. LOCATION: Matanuska Station

6. COOPERATION: Agronomy, Animal Husbandry, and Agricultural Engineering Departments; Bureau of Dairy Industry; Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases)

7. OBJECTIVE OF WORK: To determine the relative efficiency of preservation, cost of preservation, and feeding value for forages (grasses and legumes) preserved as (1) field cured hay, (2) barn cured hay, and (3) silage.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: The work will be expanded to include the Fairbanks Station now that driers are available. For the first time supplementary heat will be utilized in experimentally drying hay at either Station.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Work on this project to date has shown quite conclusively that processing roughages as silage is cheaper and in addition results in much smaller dry matter and protein losses between cutting and feeding. Over the past 3 years a comparatively large number of silos have been constructed in the Matanuska Valley.

10. PROGRESS DURING THE YEAR: In 1950 second cutting bromegrass was processed by the 3 methods listed under "Objectives," while oats-and-peas were harvested only as barn dried hay and silage. When bromegrass harvested in 1949 was fed to milking Guernsey cows it was found that a pound of dry matter in silage and barn dried hay were 33 and 13 percent more efficient, respectively, than a pound of dry matter in field cured hay. Average costs (1949 and 1950) of processing bromegrass per ton of dry matter were: field cured hay $28.43, barn dried hay $28.56, and silage $18.05. Average dry matter losses (1949 and 1950) from cutting

to storing bromegrass were 41.1, 28.6, and 21.0 percent for field cured hay, barn dried hay, and silage, respectively. Losses from storing to feeding are very small. Oats-and-peas processed in 1949 as field cured hay and silage were fed to dairy heifers and pounds of dry matter fed per pound of gain in weight were 25.2 and 6.85, respectively. Processing costs for oats-and-peas are slightly lower than for bromegrass because of larger yields per acre. Average percent dry matter losses for 1948, 1949, and 1950 were 18.4, 12.2, and 5.1 percent for field cured hay, barn,dried hay, and silage, respectively, and are smaller than for bromegrass because the amounts lost in handling represent a smaller percentage of the total yield as cut. Feeding value of good bromegrass and oats-and-pea silage are about equal. Yields per acre of oats-and-peas about equal the total of both cuttings of bromegrass. First cutting bromegrass can easily be made into field cured hay about July 1 when weather conditions are usually favorable. However, it would be used most efficiently as silage.

11. PUBLICATIONS: Better Forage For Alaska by William J. Sweetman, H. J. Hodgson, and A. H. Mick.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-8(F)

2. PROJECT TITLE: Mixtures of Grasses and Legumes

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: H. J. Hodgson and B. M. Bensin

5. LOCATIONS: Matanuska and Fairbanks Experiment Stations

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Forage Crops and Diseases); various state, Federal, and Territorial agencies

7. OBJECTIVE OF WORK: To test various mixtures of native and introduced grasses and legumes and to measure their comparative value under various types of utilization

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: This project has been recommended for discontinuance and the work performed hereunder will be combined into an expanded project, AL-1-6-12(P), Forage Crop Production. A new series of plantings will be made testing several grasses and legumes in all possible combinations. (Tests already begun will be continued and several new experiments will be begun.)

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: No direct contributions to the public welfare have been achieved by this work to date. Results do indicate which grasses and legumes mixtures should be investigated further and which should be discarded.

10. PROGRESS DURING THE YEAR: Matanuska Station: Alsike and white clover stands survived the winter on practically all plots in this test and this was attributed to a high stubble left when the nurse crop was clipped in July 1949. The first harvest in 1950 revealed no differences between mixtures as the uniform stand of alsike clover contributed the major part of the yield which averaged 9.25 tons of green matter per acre. Recovery was very poor because of extremely dry weather. Mountain bromegrass, alta fescue, Kentucky 31 fescue, and intermediate wheatgrass winterkilled completely and smooth bromegrass, meadow fescue, meadow foxtail, and timothy made the best showing in combination with the

legumes. Fairbanks Station: Clover stands were poorer in this test probably due to more vigorous grass competition. No significant yield differences were found and the outstanding grass species were the same as for the test at the Matanuska Station.

11. PUBLICATIONS: None

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-9(F) (Rev. January 30, 1950)

2. PROJECT TITLE: Weed Control

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: S. C. Litzenberger, H. J. Hodgson, and C. I. Branton

5. LOCATIONS: Matanuska and Fairbanks Stations

6. COOPERATION: Agricultural Engineering Department, Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Weed Control)

7. OBJECTIVE OF WORK: To develop a system of controlling annual and perennial noxious weeds on Alaska farms.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: In addition to continuing the evaluation program with 2,4-D, Aero Cyanate, and Dinitro for the selective control of chickweed and lambsquarters in cereal crops on an expanded scale, it is planned to do equally as much with selectively controlling these 2 prevalent weeds in newly sown grass and small-seeded legume crops. TCA and IPC are also to be evaluated in controlling wild barley in established pastures.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Experimental investigations have shown that commercially available herbicides can be satisfactorily used to control chickweed and lambs-quarters in cereal grain crops under Alaska conditions. Although quack-grass was completely eliminated with as little as 50 pounds of TCA per acre, the residual effect on succeeding rye and wheat plantings has been unexpectedly high. Woody species have been effectively controlled by 2,4,5-T, alone and in combination with 2,4-D, as suggested by other investigators.

10. PROGRESS DURING THE YEAR: Amine and ester formulations of 2,4-D, Aero Cyanate, and Dinitro were applied at 3 dates and at several rates to determine the optimum application for selectively controlling prevalent annual weeds in Edda barley, Golden Rain oats, and Khogot wheat. Pre-emergence and post-emergence applications with these same herbicides were also applied as selective weed killers on oats-and-peas. Rates

ranging from 50 to 125 pounds per acre of TCA were applied on quackgrass at varying stages of development to determine the optimum for applying this chemical. A number of trees and young regrowth of wild roses, cottonwoods, birches, willows, alders, and spruce were sprayed with 2,4,5-T, alone and in combination with 2,4-D in water and in oil, to determine the effectiveness of eliminating this type of vegetation from range or pasture lands, fence rows, right-of-ways, and similar locations.

One-fourth pound of ester form of 2,4-D most satisfactorily controlled lambsquarters in cereals while early spray applications at 16-1/2 pounds per acre of Aero Cyanate gave best kills with chickweed. Post-emergence applications of Dinitro at 1 gallon per acre appeared most promising as a general selective herbicide for oats-and-peas for forage as it resulted in 96 percent control of chickweed and lambsquarters. Excellent kills were obtained on woody species with 2,4,5-T.

11. PUBLICATIONS: None

ALASKA AGRICULTURAL EXPERIMENT STATION
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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-6-10(R,H)

2. PROJECT TITLE: Evaluate United States Introduced and Developed Strains of Cereal Crops for Adaptation to Subarctic Conditions

3. PERIOD COVERED BY THE REPORT: January 1 to December 31, 1950

4. SUPERVISORY LEADERS: S. C. Litzenberger and Assistant Cereal Crops Specialist yet to be appointed

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Bureau of Plant Industry, Soils and Agricultural Engineering (Division of Cereal Crops and Diseases and Division of Plant Exploration and Introduction) and other state, Federal, and Territorial agencies.

7. OBJECTIVE OF WORK: To evaluate thoroughly all available strains of cereal crop varieties when grown under subarctic conditions for agronomic characteristics which may have an influence on adaptation or use of these varieties for experimental or commerical purposes.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: The World Collections of oats and flax varieties will be grown in single 5-foot rows at the Matanuska Experiment Station near Palmer for agronomic evaluation.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Since this project was activated late in 1949, it is premature to list at this time any major contributions.

10. PROGRESS DURING THE YEAR: The World Barley Collection, numbering 5,215 varieties, made available through the Division of Cereal Crops and Diseases and the Division of Plant Exploration and Introduction, was planted at the Matanuska Station near Palmer in single 5-foot rows. All entries were evaluated for date first headed, date fully headed, date ripe, plant height, lodging, floret sterility, and the prevalence of leaf spot (Helminthosporium and physiologic causes). The 368 promising varieties harvested for further consideration will be sown in 1951 in single-row plots at 3 selected locations - Matanuska Valley (Palmer), Tanana Valley (College), and Kenai Peninsula (Soldotna).

11. PUBLICATIONS: None

United States Department of Agriculture

WORK PROJECT ANNUAL REPORT

1. WORK PROJECT NUMBER: AL-1-7

2. DIVISION: Alaska Agricultural Experiment Station
Don L. Irwin, Director

3. BUREAU OR AGENCY: Agricultural Research Administration

4. WORK PROJECT TITLE: Entomological Investigations

5. PERIOD COVERED BY THE REPORT: May 26 to December 31, 1950

6. SUPERVISORY LEADER: Richard H. Washburn

7. LOCATIONS: Palmer and Fairbanks, Alaska

8. COOPERATION: Soil Science Department (fertilizer), Agronomy Department (labor and land preparation), Horticulture Department (plant materials and labor), Bureau of Entomology and Plant Quarantine (insect identification).

9. OBJECTIVE OF CURRENT WORK: To develop insect control measures that will be effective in facilitating crop, livestock and poultry production under Alaskan conditions; work out the biology of Alaskan insect species, continue list of Alaskan insects; conduct investigations in insect pollination of crop plants and biological control measures of injurious insects.

10. PROGRESS DURING THE YEAR: Root maggots (AL-1-7-1(A): studies on biology, control experiments, resistance variety studies in turnips, wild host plant studies and extent of maggot activity throughout the Territory. Cutworm Investigations (AL-1-7-2(F): studies on biology, control and parasite collections. Effect of Soil Treatments on Soil Biota and Future Plant Growth (AL-1-7-3(F): effect of insecticides on several crop plants grown in Alaska and effect on soil inhabiting insects and microorganisms.

11. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Materials have been found which offer control of cutworms and probably of root maggots under correct timing of applications.

12. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Root maggot biology and control will be investigated in the Matanuska and Tanana Valleys (AL-1-7-1(A). Cutworm biology will be further examined, parasites collected and control experiments carried out in the Matanuska Valley (AL-1-7-2(F). Effect of soil treatments on plant growth and soil biota in Matanuska Valley will be further examined (AL-1-7-3(F).

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-7-1(A)

2. PROJECT TITLE: Root Maggots

3. PERIOD COVERED BY THE REPORT: May 26 to December 31, 1950

4. SUPERVISORY LEADER: Richard H. Washburn

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Soil Science Department (fertilizer, Agronomy Department (land preparation and labor), Horticulture Department (plant material and labor), Bureau of Entomology and Plant Quarantine (insect identification).

7. OBJECTIVE OF WORK: To investigate the root maggot incidence, wild host plants, dissemination and crop plant damage under various environmental conditions in field and controlled conditions to determine an effective means of control for turnip, seed-corn and onion maggots.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Major emphasis during the coming year will be placed on continuing biological studies of the root maggots, development of control procedures, continuing search for wild host plants, and environmental relationships to maggot incidence in cultivated plants.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Several insecticides have been tested which offer possibilities of root maggot control in an easier manner than current methods.

10. PROGRESS DURING THE YEAR: Eleven insecticides have been tested against root maggots and of these chlordan, parathion, lindane, aldrin and dieldrin look most promising. Maggots have been reared under laboratory conditions from larva to adult. A high moisture content medium is most desirable. Onion maggots were found in widely scattered localities including Circle Hot Springs and Anchorage. Turnip and/or seed-corn maggot complex was found in all areas visited from Anchorage to Circle. Three species of wild host plants were found in preliminary collections of maggot infested Brassicaceae. Petrowski turnips were found to be slightly, but not significantly, more resistant to root maggots injury than white-fleshed varieties.

11. PUBLICATIONS: None.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-7-2(F)

2. PROJECT TITLE: Cutworm Investigations

3. PERIOD COVERED BY THE REPORT: May 26 to December 31, 1950

4. SUPERVISORY LEADER: Richard H. Washburn

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Animal Husbandry Department (oat-pea field), Agronomy Department (bromegrass plots), Bureau of Entomology and Plant Quarantine (insect identification).

7. OBJECTIVE OF WORK: To find an efficient means of control for the several species of cutworms important in the Matanuska Valley.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Collection and rearing of larvae, collection of parasites, comparison of insecticide soil treatments, comparison of baits and sprays or dusts as control measures. Isolation of disease organisms from diseased cutworms, and investigation of this possibility as a control measure.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Several insecticides have been tested which offer good control possibilities.

10. PROGRESS DURING THE YEAR: In the Palmer area cutworm infestation was light this year. Earliest damage was noted May 25, 1950. Value of soil treatments and baits was uncertain as no cutworm appeared in areas treated. Chlordan emulsion was very effective as a control measure in infestations in onions, peas, bromegrass plots. In tests in oats-bromegrass field in order of decreasing effectiveness were chlordan emulsion, parathion, aldrin, dieldrin, and chlordan wettable powder. Baits were not tried due to low cutworm population. Lack of greenhouse facilities made life history studies difficult to carry out. Only a small percentage of those collected as larvae emerged as adults. Determinations have not been completed so the possibility of additional species is not known at this time.

11 PUBLICATIONS: None.

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ANNUAL PROGRESS REPORT, FEDERAL AND FEDERAL-GRANT PROJECTS, 1950

1. PROJECT NUMBER AND FUND: AL-1-7-3(F)

2. PROJECT TITLE: Effect of Soil Treatment on Soil Biota and Future Plant Growth

3. PERIOD COVERED BY THE REPORT: May 26 to December 31, 1950

4. SUPERVISORY LEADER: Richard H. Washburn

5. LOCATION: Matanuska Experiment Station

6. COOPERATION: Soil Science Department (fertilizer), Horticulture Department (plant material and labor), Agronomy Department (labor).

7. OBJECTIVE OF WORK: To determine long range effect of soil insecticides on plant growth and soil organisms under Alaskan conditions.

8. LINES OF WORK TO RECEIVE SPECIAL ATTENTION DURING THE COMING YEAR: Major emphasis during the coming year will be on testing a greater variety of plant materials and continuing examination of soil as to insects and microorganisms.

9. TELL BRIEFLY 1 OR MORE IMPORTANT CONTRIBUTIONS SUCH AS PUBLIC BENEFITS OF THE PAST 3 YEARS WHICH JUSTIFY CONTINUED SUPPORT OF THIS WORK: Soil treatments at 25 pounds to the acre of common organic insecticides produced no immediate serious effects on growth of oats, bromegrass, radishes or turnips. The fact that one of the insecticides, namely, parathion, gave complete protection against root maggots for the season offers a definite possibility of control in 1 treatment.

10. PROGRESS DURING THE YEAR: DDT, aldrin, dieldrin, parathion, chlordan, methoxychlor, and lindane were mixed into the soil at a rate of 25 pounds to the acre. No effect in growth or maturity was noted in radishes, turnips, oats or bromegrass. The fact that no maggot damage appeared in parathion, and little in lindane, aldrin, or dieldrin plots offers an excellent lead in control possibilities. Examination of soil microorganisms has not been completed.

11. PUBLICATIONS: None

ALASKA WORK AND LINE PROJECT INDEX